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CONTENTS

FEATURE

Hygeia's Sisters: A History of Women in Pharmacy 1
by Patricia Spain Ward

OF INTEREST

The Pest House at Jaffa:
Medicine, Art and French Romantic Painting 58
by Joseph M. Merrill and Hebbel E. Hoff

FOCUS

The Bakken: A Library and Museum of Electricity in Life 74
by John Senior

Early Modern Cardiology 90

ANNOUNCEMENTS 94

Untitled, this seventeenth-century painting of the interior of an apothecary shop has been attributed to Bavarian artist Ölgemälde. One of the earliest known portrayals of its kind, the painting unmistakably associates the ghostly form of Hygeia with that of the contemporary pharmacist at work behind the counter. As she ministers to the reclining patient, her father Asclepius leans against a pedestal bearing a bust of Hippocrates, at the right of the painting. Near Asclepius sits a contemporary physician, consulting a textbook on therapeutics and probably prescribing for the patient. (Reproduced from Apothekers Kalandar, *1933, with permission from Sammlung des Apothekers Conrath-Reichenberg, Berlin 8 und 9, April 1930, Katalog no. 342. Photo courtesy of Kremers Reference Files, F.B. Power Pharmaceutical Library.)*

Hygeia's Sisters: A History Of Women In Pharmacy

by Patricia Spain Ward

During the decade of the 1970s, women became a numerical force in the pharmaceutical profession of the United States. They were most visible in independent community pharmacies, in private hospitals, and in large chain community pharmacies--the three practice settings they most commonly selected as of 1974. Women also appeared in growing numbers in small chain community pharmacies, in various types of government hospitals and in clinic or medical building pharmacies. More rarely, though still in greater numbers than ever before in American history, they taught at colleges of pharmacy and worked in nursing homes or at pharmaceutical manufacturers and wholesalers.

Between the mid-fifties and mid-seventies, the number of pharmacy degrees awarded to women increased by 510 percent. In 1979-1980 women constituted 45 percent of pharmacy students nationwide and a majority in one quarter of the schools. By 1980, when women were 9.5 percent of physicians and 1.65 percent of dentists, they constituted a larger proportion of pharmacists (12 percent) than of any other formerly male-dominated health profession in the United States. In 1988 women are 59 percent of pharmacy students and one-sixth of pharmacy faculties, promising to fulfill the prediction by the Department of Health and Human Services that women will constitute one-third of all pharmacists in the United States by 1990.[1]

In the perspective of history, these figures embody a remarkable reversal of an exclusionary trend that began long ago. Although it is true that women played important roles in health care in every culture known to us (the first human to gather healing plants and compound remedies--the original

"pharmacist"--was probably a woman), the health professions excluded women when formal education developed in the nineteenth century, in tandem with licensure laws requiring prior education. Until the past few decades, women remained so sparsely represented in the health professions that we tend to forget their prominence as herbalists, bonesetters, midwives and health educators over many centuries of pre-professional history.

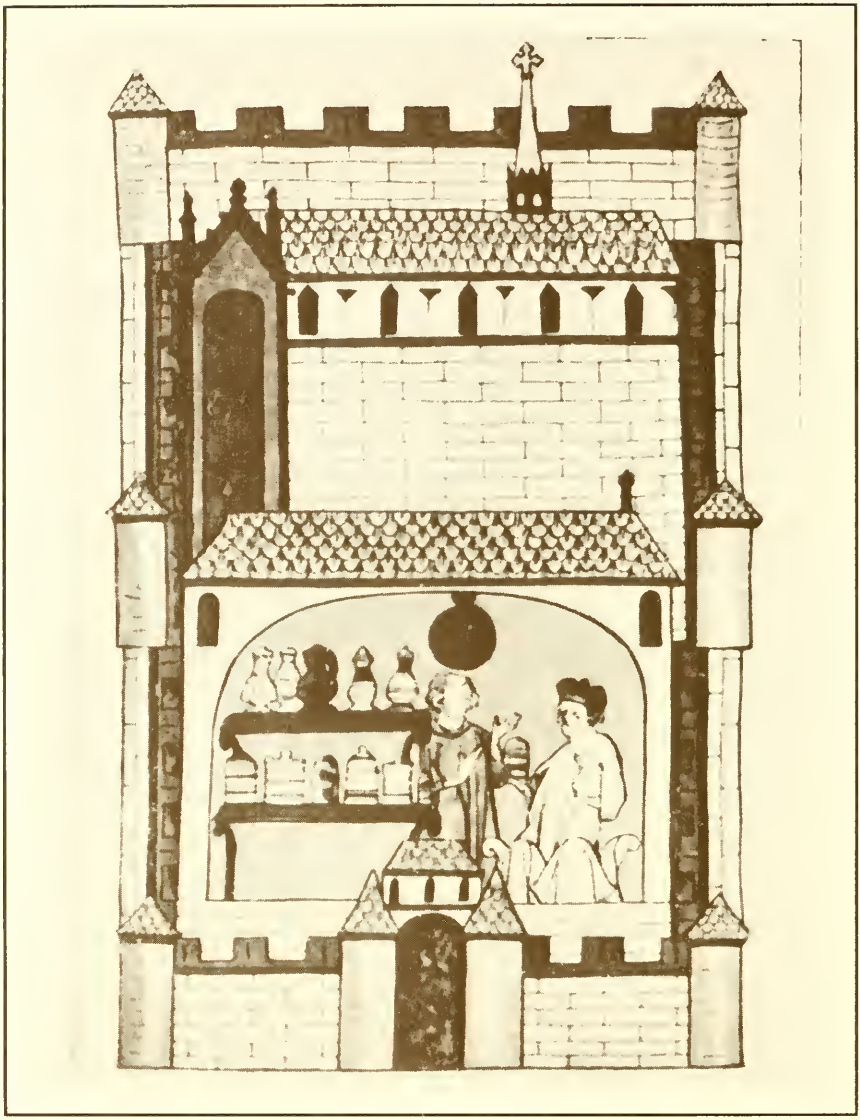
Mythology, which is the record of prehistoric ages, has preserved impressions of so many women healers that it is possible to recall only a few. Isis was a major deity of antiquity, with many of the prerogatives of the Indo-European sky god. Along with commanding the thunder and lightning, dividing the heavens from the earth, and assigning languages to earth dwellers, she had the duty of watching over the health of the human species.[2] Hecate, the moon goddess, was a specialist in children's diseases. The two daughters of Helios, the sun god, were worshipped as midwives and healers. Medea and Circe specialized in antidotes to poison. Aphrodite, in the form of a dove, was believed to have special skill in skin diseases and children's fevers; Artemis and Athena to cure blindness by the use of herbs; Leto, the surgeon, to cure wounds and officiate at difficult births.[3]

Hygeia and Panacea, daughters of the Greek healing god, Asclepius, have become household words for health and healing. The most widely recognized symbol of pharmacy in the western world today is the serpent and bowl, sometimes called the "Bowl of Hygeia." Yet even among pharmacists, few are aware that the bowl is merely a fragment of the once-full pharmaceutical symbolism of Hygeia.[4] In the dreams of healing that played an important part in the medicine of antiquity, Hygeia accompanied her father, ministering to the afflicted from a bowl that she always kept with her. Like Asclepius, she carried a sacred serpent, which could initiate divine healing by a flick of its tongue. A general symbol of healing for the ancients, the figure of Hygeia with her bowl and serpent began to appear in specific connection with pharmacy in artistic portrayals of the seventeenth and eighteenth centuries. Later, over the course of the nineteenth and twentieth centuries, just as the figure of Asclepius gradually disappeared from the symbolism of medicine, leaving only the staff and serpent (the caduceus), so the figure of Hygeia dropped out, leaving the serpent and the "Bowl of Hygeia" as the symbol of pharmacy.[5]

At the line where history and mythology merge, Homer and other classical writers reveal that women frequently practiced the healing arts. Helen of Troy studied in Egypt with the famed physician, Polydamna, who instructed her in the use of pain-relieving substances, perhaps opiates mixed with other herbs.[6]

AN ABBESS AS PHARMACIST—13TH CENTURY

This woodcut illustrates pharmaceutical activity by religious women during the Middle Ages. From an array of medicinal plants spread out on her work table, the abbess is selecting herbs for the remedy she is preparing. The assistant in the foreground is collecting distillate from a cucurbit (the gourd-shaped vessel atop a small furnace). (Reproduced from Kremers Reference Files, F.B. Power Pharmaceutical Library, courtesy of American Institute of the History of Pharmacy.)



Although Trotula's surgical skills were notable, her fame beyond Italy rested on the extraordinary cures she effected, explained in her book, De Compositione Medicamentorum (The Compounding of Medicaments). *H. J. Mozans* (Woman in Science, *pp. 285-286) tells of her influence on French travelling herbalists, who often bolstered their own therapeutic claims by acknowledging her influence, calling her the "wisest woman in the four quarters of the world." According to Rudolfo Malacorona, one of the famous itinerant scholars of the Middle Ages, Trotula was the only scholar he found in Salerno who could cope with him in learned disputation. (Reproduced courtesy of Charles and Dorthea Singer.)*

Of Agamede Homer says that she "understood as many drugs as the wide earth nourishes:"

> Agamede, with the golden hair,
> A leech was she, and well she knew
> All herbs on ground that grew.[7]

According to Pliny, Olympias, a woman physician of Thebes, wrote a valuable book of prescriptions, with one chapter on the diseases of women, another on the prevention of abortion, and still another on the best way of causing an abortion if necessary. The Greek physician, Agnodice, reportedly had skills of such magnitude that her example forced the legal opening of the medical profession to all free-born Attic women.[8]

Outstanding medical women of the Middle Ages whose names have come down to us include Trotula, who held a chair in the Salerno school of medicine and wrote many medical works, some of them published after the invention of printing; Hildegard, the Benedictine Abbess of Bingen, whose several surviving works on therapeutics suggests why the convents of the later Middle Ages were famed as centers of healing; and Jacobe Felicie, who practiced so successfully in fourteenth-century France that she was tried and fined on the frankly economic change of "putting her sickle in another man's harvest."[9]

In this earlier age in Europe, as in nineteenth-century America, the exclusion of women from healing roles came about gradually, hand in hand with the growth of scientific knowledge which led to formal education and licensure. Beginning generally with the rise of universities, when education for women took refuge in convent settings ultimately closed during the Reformation, the exclusionary process advanced unevenly in different parts of Europe. As women found themselves progressively shut out from the training essential for competency, they sometimes recorded their protests. In her obstetrics textbook, published in 1609, Louise Bourgeois attributed the mistakes midwives sometimes made to their lack of education, particularly in anatomy.[10]

Artistic renderings sometimes reflected the anti-feminist sentiments underlying the process of exclusion. In *Cymbeline*, written between 1610 and 1611, Shakespeare presented a hostile portrait of the pharmaceutical woman:

> The Queen studied to be an Apothecary in order to concoct poisons and (to give the Lady her full due) antidotes to poisons.

As Shakespeare designed her character, the Queen is "a crafty devil, a woman that bears down with all her brain," someone who is "hourly coining plots." Even the royal physician who had taught her to compound drugs describes her as "devilish": fearing that she may do harm with the pharmaceutical knowledge he has given her, he refuses to provide her with potentially dangerous substances. Without placing too much historical weight on *Cymbeline* (a light play which Shakespeare wrote, along with *The Tempest,* directly after creating *Hamlet* and *King Lear*), it is noteworthy that it is a woman with skills in pharmacy who stands as one of Shakespeare's most ominous female characters in a period when misogyny was the playwright's stock-in-trade.

In 1628, just seventeen years after Shakespeare presented *Cymbeline*, his embodiment of the unscrupulous woman, not to be trusted with the dark knowledge of the pharmacopoeia, Jane Hawkins was banished from the Massachusetts Bay Colony on charges of "trafficking and meddling in oils, plasters and physick." Hawkins is the earliest woman whose name survives in connection with pharmacy in the North American colonies. It is unclear whether she was banished as the result of some primitive effort at food and drug regulation, or whether she had angered colonial officials in some other way.[11]

Twenty years later Margaret Jones, a Massachusetts Bay Colony practitioner who relied heavily on the use of herbs and other simple prescriptions, became the first person to be hanged as a witch in Boston.[12] Even though the charge against Jones was worded in terms of causing bodily harm, colonial historians now believe that she was punished because of her dissident political views, rather than out of envy of her successful practice. Healers of either sex apparently were too highly valued in the early settlements to be sacrificed on any grounds not considered vital to the interest of the entire community.

In 1938, writing a survey of women in healing roles from earliest times to 1800, Dr. Kate Campbell Hurd-Mead found evidence that several colonial women had been cherished for their skills. There was "Doctoress Joanna Smith" of New London, Connecticut, who made "salves and tonics" and had a reputation for treating wounds and bruises. From the journals of Governor John Winthrop of the Connecticut Colony, himself a compounder of medicines in the late seventeenth century, Hurd-Mead learned that he also used "some yellow and black plasters given me by a woman that is very skillful and much sought unto for these things."[13] A Widow Bradley in the New Haven Colony provided such satisfactory health care to her neighbors that they voted in 1635

to give her a house and a lot--a form of payment which they also made to one of the three male practitioners in the settlement. Katharine Hebden, whose husband sold both drugs and coffins in mid-seventeenth-century Maryland, herself sold "physick" in exchange for tobacco, performed "chirurgy" on a man's "legg" and then nursed him, "dieting him for seven weeks or thereabouts." One of Katharine Hebden's remedies was a version of mithridate containing twenty ingredients.[14]

Several of the few colonial women's names known to us survive in connection with specific remedies. Thus there is Mrs. Masters' "Tuscarora Rice," produced in 1711 in a New Jersey factory, for the treatment of consumption (pulmonary tuberculosis); Mary Bannister's "Drops of Spirits of Venice Treacle," advertised in 1731; Sarah Murray's Tar Water, marketed in the mid-eighteenth century; and Ann Tatnall's Powders, famous at the time of the American Revolution.[15]

The earliest women known as practitioners of pharmacy in the more conventional sense include two Bostonians: Elizabeth Greenleaf, who founded a prosperous pharmacy in 1726-27; and Mistress Jane Loring, who operated a pharmacy in 1800. In Philadelphia in 1805 Elizabeth Marshall took over the pharmacy her grandfather had founded in 1729. Having rendered valiant service to the Revolutionary armies throughout the long war, the Marshall apothecary shop had fallen on hard times and reportedly was insolvent when Elizabeth took charge. Under her management over the next twenty years, it once again blossomed into a thriving business.[16]

In the pre-professional period of American pharmacy, before most states and territories enacted pharmacy practice laws (twenty-one did so in the 1880s, twelve more in the 1890s), many women who practiced pharmacy were the wives or daughters of pharmacists. According to the Census of 1870, 17,335 men--but only 34 women--listed their occupations as "traders and dealers in drugs and medicines." Emma Gary Wallace, a turn-of-the-century chronicler of women pharmacists, has suggested that a majority of these thirty-four were probably "unqualified drug store and hospital assistants, while some few were probably makers of salves, lotions and herbal remedies."[17]

By 1900 there were 1,178 women practicing pharmacy in the United States--about 2 percent of the national total and more than thirty times the number of women who had been in the field in 1870.[18] At that same time, however, it is interesting to note that there were more than six times as many women in medicine as in pharmacy (5.6 percent of the total physician population). These figures reflect half a century of women's struggle for access

to medical education, a struggle in which men and women committed to professional equality for the sexes established medical schools for women as well as hospitals run by women, where women physicians could perfect their training.[19]

Why was there no comparable movement of women into American pharmacy earlier in the nineteenth century? As is often the case where historical causation is concerned, the answer to this question has numerous parts.

One factor which cannot be discounted is that educational prerequisites developed later in pharmacy than in medicine. Most states had passed medical licensure laws early in the nineteenth century, long before attempts were made to regulate the practice of pharmacy (then not yet completely separated from medicine). Since it was by means of these prerequisites that women were excluded from practice, the formal challenge to women who wanted to act as healers came first from medicine, and it was against medical exclusion that they first marshalled their forces. Three of the twelve resolutions presented in 1843 at the Woman's Rights Convention at Seneca Falls, New York, dealt with equal access to the professions, with medicine predominant in the writers' intentions.[20]

The Woman's Rights Movement, and the accompanying drive of women into medicine in mid-nineteenth-century America, were only parts of the more profound upheaval which historians call "Jacksonian Democracy." A social revolution of undoubted importance for the development of medicine and pharmacy, this movement encompassed not only women's rights, transcendentalism, and the abolition of slavery, but also dietary and temperance campaigns inspired by America's notorious eating and drinking habits. In their determination to expunge every vestige of status and special privilege from American society, Jacksonians demanded--and, in most states, achieved--the repeal of medical licensure laws. They also attacked heroic medical practices: depletive measures such as bleeding, purging, vomiting and massive dosing with toxic substances including mercury, antimony and arsenic. In place of these practices they supported such measures as botanical medicine, hydropathy or naturopathy: forms of treatment which even relatively uneducated lay practitioners might employ.

A wave of enthusiasm for Thomsonian (botanical) medicine swept the country after 1825, giving rise to the motto, "Every man his own physician." By mid-century, Thomsonian inroads on the domain of "regular" medicine were being overtaken by yet another new school of healing called homeopathy.

In this pharmaceutical laboratory at the Woman's Medical College of Pennsylvania, Joseph Remington and Susan Hayhurst taught medical students to compound standard medicinal preparations. Women in these classes were later able to make their own medications, if they found themselves practicing in remote areas or confronting a pharmacist who refused to fill prescriptions written by a woman. In the course in "Practical Pharmacy," taught here beginning in 1876, women doctors of the future also learned to become discerning judges of pharmaceutical quality in the prescriptions compounded for their patients by others. (Photo courtesy of Archives and Special Collections on Women in Medicine, Medical College of Pennsylvania.)

Using minute doses of dilute preparations of animal and plant substances, homeopathy appealed particularly to women, who made up approximately two-thirds of its patients and a number of its practitioners. As one contemporary observed in explaining the rapid rise of homeopathy, "many a woman, armed with her little stock of remedies, has converted an entire community."[21]

Health reformers continued to downgrade medication in favor of physiological remedies beyond the mid-nineteenth century. Listen to one of them speaking in 1858, on the eve of the American Civil War:

> Cheer up, ye sick and drooping: there is a panacea for your ills; it is not to be found in poisonous drugs, but in heaven's pure air, the soft, refreshing water that issues bubbling from the hillsides, appropriate exercise, and proper diet; then cheer up, ye disconsolate ones! And be assured there is a balm in Gilead, and there are true physicians.[22]

As this speaker's religious overtones suggest, the health reform movement conveyed an almost spiritual fervor in its condemnation of "poisonous drugs," particularly chemical drugs, often used at that time in heroic dosages. In this pervasive atmosphere of social upheaval and antipathy toward professional distinctions, it is not surprising that women who wanted to act as healers were likely to migrate toward some form of sectarian medical practice rather than toward pharmacy itself.

At the beginning of women's drive for access to the medical profession, one male physician used the prevailing arguments against women in medicine to urge their employment instead as apothecaries' helpers. In 1853, writing the thirty-fifth Annual Report of Philadelphia's Northern Dispensary for the Medical Relief of the Poor, Dr. Thomas H. Yardley suggested that, although woman's "delicacy of frame" and the "great susceptibility and excitability of her nervous system" rendered her "unfit for the rougher duties of the medical profession," she was naturally suited for the work of "pharmaceutist," by virtue of her "greater neatness, care and cleanliness." "If apothecaries would employ intelligent and educated females" for compounding prescriptions, he said, "there would be fewer mistakes and accidents." Yardley believed that "pills, confections, and juleps would be less nauseous if prepared by the clean and delicate fingers of a lady, than when mixed by the soiled hands of slovenly shop boys."[23]

It is significant that Dr. Yardley envisioned women as employees of apothecaries, not as the operators of their own pharmacies. He thus typified

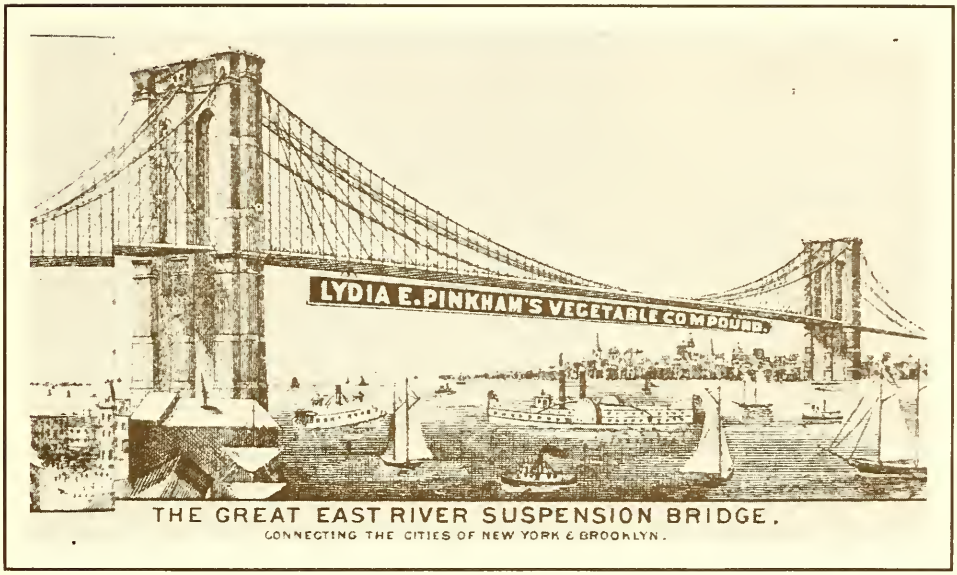
Lydia Pinkham (1819-1883) initially prepared her Vegetable Compound for the benefit of family, friends and townspeople in Lynn, Massachusetts. When her husband's economic misfortunes inspired her sons to market her tonic widely, under a label carrying this portrait, Lydia Pinkham's face became famous--and was sometimes used by the popular press to substitute for that of Queen Victoria. (Photo courtesy of Schlesinger Library, Radcliffe College.)

the general disapproval of women in business which was yet another barrier to women entering pharmacy, at least until late in the century. This sanction was so strong that historians of this period have labeled the resulting societal code the "doctrine of separate spheres."

Although Lydia E. Pinkham made her own Vegetable Compound, it was her sons who, in 1876, began the marketing that made this remedy one of the most successful competitors in the crowded field of proprietary medicines. Mrs. Pinkham was an almost classic representative of those enthusiasms (temperance, Grahamism, botanical medicine, phrenology) already mentioned as characteristic of mid-nineteenth-century American reformers. The "Department of Advice" she maintained, to give medical counsel to women who were unwilling to bring "female complaints" to male physicians, relied heavily on such physiological means as diet, exercise and cleanliness. There is irony in the fact that Lydia Pinkham, a woman without pharmaceutical education, remains better known a century after her death than any woman in the field in the more recent professional period.[24]

During the Civil War many American women learned for the first time to organize for work outside the home. In the post-war period they began to apply their new-found social skills to the problems of an increasingly urban America. The organized charities movement, the growth of professional nursing, the settlement house movement: all were products of this change in women's perceptions of themselves and of their place in society. In the South, where the war left many women without the fathers, husbands and sons on whom they had traditionally relied for support, the new phenomenon of the working woman spread rapidly through middle and upper class families.[25]

At this time women began to seek formal education for pharmacy. In 1863 Mary Putnam Jacobi, later one of America's most distinguished physicians and the first woman elected to the New York Academy of Medicine, became the first woman to take a pharmacy degree in the United States.[26] The New York College of Pharmacy where she studied did not award another degree to a woman for twenty-five years. During that period many women (and men) who began studying pharmacy dropped out before graduation, because it was still possible then to practice pharmacy without costly formal education. As the transition to professional pharmacy accelerated, women joined the process. In 1871 Mary Upjohn was graduated from the University of Michigan School of Pharmacy, an institution which produced three additional women pharmacy graduates by 1877 and twenty-seven others (more than any other single American school) by 1896.[27] Other pharmacy schools granting degrees to women in that early period were the Massachusetts College of Pharmacy


LYDIA E. PINKHAM'S VEGETABLE COMPOUND.
THE GREAT EAST RIVER SUSPENSION BRIDGE.
CONNECTING THE CITIES OF NEW YORK & BROOKLYN.

This sketch depicts the advertising dream of Lydia Pinkham's most aggressive son, Daniel, a marketing genius who helped turn his mother's home remedy into the foundation of a family fortune. Dan Pinkham envisioned this massive banner adorning the Brooklyn Bridge, which was the world's longest suspension bridge at the time of its construction between 1869 and 1883. This imaginary prototype of today's billboards would have dominated the East River in what was then the nation's population center. When Dan died of tuberculosis in 1881, at the age of thirty-two, sales of the tonic stood at almost $200,000 yearly. Although Lydia Pinkham died in 1883, the family enterprise continued to prosper. In 1888 the Vegetable Compound was the most heavily advertised product in the United States. Sales reached an all-time high of more than three million dollars in 1925. (Photo courtesy of Schlesinger Library, Radcliffe College.)

(Louise Baker, 1877); the Chicago College of Pharmacy (Marion Tirrell, 1878); and the Philadelphia College of Pharmacy (Susan Hayhurst, M.D., 1883).[28]

Women in Europe began moving into pharmacy at about this same time, entering practice in the Netherlands in 1872, passing qualifying examinations in Belgium in the 1880s, beginning the study of pharmacy in Germany, Sweden, Norway, Russia, Spain and Great Britain in the 1890s.[29] What seems unusual in the United States is the number of women who, like Mary Putnam Jacobi, earned pharmacy as well as medical degrees. Men also sometimes pursued formal education in both fields, possibly because medical practitioners in country or small town practice often had to compound their own prescriptions. Access to a druggist, however, did not always mean access to reliable compounding in those pre-professional days of American pharmacy. In announcing a new course in "Practical Pharmacy" in 1876, the Woman's Medical College of Pennsylvania catalog noted the "importance to physicians of being able to discriminate between preparations of competent and of incompetent druggists, whose field trenches so closely upon that of the prescriber." Practical work with standard medicinal preparations would give these future women doctors "a confidence in judgment not to be secured in any other way."[30]

There may be still another explanation for the surprising number of women taking both degrees. The first wave of women doctors entered practice in the face of violent public opposition. Pharmacists, sharing the prevailing disapproval of women in medicine, sometimes refused to fill their prescriptions. There is an account of one such instance in the autobiography of a pioneer American woman doctor, Hannah Myers Longshore (1819-1902), a medical graduate in the first class at the Female Medical College of Pennsylvania (later Woman's Medical College, now Medical College, of Pennsylvania). Longshore received her M.D. with seven other women in 1851, in ceremonies that required police protection because of riotous protest demonstrations by male medical students in the Philadelphia area.[31] She set up her practice only to face further obstacles:

> The doctors united with the druggists to prevent, if possible, the success of our professional undertaking. They predicted six months would end the craze. A few weeks after my graduation, I received a call to visit a refined and cultivated woman. I wrote a prescription which. . .a druggist refused to fill because it was written by a woman.[32]

Mary Putnam Jacobi

The first woman pharmacy graduate in the United States (at the New York College of Pharmacy in 1863), Mary Putnam Jacobi took a medical degree the next year at the Woman's Medical College of Pennsylvania and a second M.D. at the École de Médicine in Paris. The first woman elected to membership in the New York Academy of Medicine, Jacobi had a distinguished career in teaching and research. She effectively rebutted the widespread idea that women are unable to work during menstrual periods and pioneered in studying the influence of environment on health. (Photo courtesy of Archives and Special Collections on Women in Medicine, Medical College of Pennsylvania.)

A member of the first class to graduate from the Female Medical College of Pennsylvania (where she also served on the faculty), Hannah Myers Longshore was one of the first women medical graduates to establish a successful practice in the United States. Because Philadelphia druggists sometimes refused to fill prescriptions written by a woman physician, she carried an emergency kit in order to compound her own medications. (Photo courtesy of Archives and Special Collections on Women in Medicine, Medical College of Pennsylvania.)

The druggist also suggested that the patient was risking her life by entrusting it to a woman and told her to change doctors. She refused. When Dr. Longshore next visited her, the patient said she wanted "no other doctor but you, let the case terminate as it may." The patient recovered, but this experience forced Dr. Longshore to practice as if she were a country doctor, without reliable access to pharmacists. She began to carry an emergency medicine case, prepared to compound her own prescriptions when necessary.[33]

Despite harassment, Dr. Longshore was soon well-launched on a practice that eventually included three hundred Philadelphia families, a practice as large as any physician could handle in that era of horse-and-carriage housecalls.[34] Her difficulties with pharmacists erupted again, however, on an occasion when she tried to buy some "Sulphate Cinchona" (quinine). The store owner looked at the business card she had set on his counter, looked at her, and said, "I will not sell this cinchona to you. You are out of your sphere. Go home and darn your husband's stockings. Housekeeping is the business for women."

> I informed him that the stockings were darned, my house was probably as well kept as his, and as a graduate of the Female Medical College, chartered by the Legislature of Pennsylvania, I proposed to practice medicine as long as the women of Philadelphia saw fit to employ me, and I have the strength to work. Laying my emergency case open on the counter I told him it had kept dollars out of his business and would keep more.[35]

Telling this story many years later, Dr. Longshore recalled that as she turned to leave the store, the proprietor offered to sell her the quinine for two dollars. She reminded him that the usual price to physicians was $1.50. He agreed to take that amount, and a few days later sent her a note: "Dear Doctor: I will be happy to show you anything in our line. Your obedient servant. . . ." Dr. Longshore concluded: "He has continued to be the obedient servant of women doctors ever since."

Experiences like this may explain why so many women in the late nineteenth century studied pharmacy as well as medicine. Exactly how many did so may never be known. As one scholar has discovered in attempting to compile a comprehensive directory of women pharmacists in America up to 1900, those who recorded the existence of pharmacy schools in the late nineteenth century disagreed as to which schools were legitimate exemplars of pharmaceutical education. Out of ninety-two schools now believed to have functioned at some time before 1900, no fewer than twenty-seven appear to

have been excluded by one source or another. Because the evidence is contradictory and incomplete from this period before hard and fast standards were established for pharmacy education, even the names of many early woman pharmacists remain unknown.[36]

It is true that women in the United States generally had easier access to education in pharmacy than in medicine. In 1879 the Conference of Schools of Pharmacy declared as policy that it had "no objection to admitting women."[37] Contrast this policy with the action of the American Medical Association, the nineteenth-century arbiter of medical education, which as late as 1860 refused to recognize any medical school that admitted women, even declining to seat a duly-elected woman physician as a delegate to its annual meeting until 1871. Because it was easier for women to enter pharmacy schools, it was not necessary for them to create anything comparable to the seventeen women's medical schools which educated a large number of the country's women doctors between 1850 and 1900.[38]

Apparently, the only pharmacy school which was founded exclusively for women is the Louisville College of Pharmacy for Women--which, despite its name, sometimes admitted men. This short-lived institution (1883-1896) was the creation of Joseph P. Barnum, a Kentucky pharmacist who wanted to train women he could employ in his drugstore (which also housed the school). At that time, the Louisville College of Pharmacy admitted males only; Tulane did not admit women to laboratories until 1888 and to the full course until 1894. As was often the case with women's medical schools, Barnum's pharmacy school for women required a longer course of study than the male schools of the day: the initial two-year curriculum of thirty-six weeks each was lengthened in 1884 to three years of thirty-six to forty-two weeks each. Except for permitting women to graduate at eighteen (twenty-one was customary in the men's schools), the requirements were typical for that period. Students heard three years of lectures in Theory and Practice of Pharmacy; Chemistry; *Materia Medica*; and Botany and Microscopy. After they also had completed three years of practical work (permitted to be concurrent with course work), they received a diploma.[39]

In the 1890s Barnum's school fell victim to declining enrollment (as other pharmacy schools began to admit women) and to a series of fires. Before it succumbed to the depression of 1893, the Louisville College of Pharmacy apparently graduated between twelve and sixteen women pharmacists.[40]

At the college's first commencement, the proud young graduates heard Dr. D. W. Yandell, a prominent Louisville physician and a former president of the

American Medical Association, give advice that--however laudably realistic--must surely rank as some of the most discouraging on record:

> You have chosen to align yourselves with man. You have become his competitor for bread, his rival in work. Look for no other treatment than that he gives his fellows. The lines of commerce are merciless and true banking knows no friends. The homage which has hitherto been spontaneously yielded you will be rendered no more. . . . You have elected this. Competition in pharmacy--rivalry in work--you will find no less sharp than men find it. Many hands that were once held out to you will now have their backs turned toward you. All this you must expect.[41]

Discrimination at the state pharmacy board level was likely to be the first manifestation of the hostility the speaker had predicted. Although the Kentucky State Pharmacy Board was obliged by the Kentucky Pharmacy Act of 1874 to license all graduates of regular, incorporated schools, women elsewhere sometimes had to fight for licensure even after they had finished a regular course of study. Eliza Rudolf, who was born 1852, is an example of a Louisiana woman who overcame almost unbelievable obstacles of this kind, inspiring one writer to coin the phrase "pharmacy's 'sufferettes.'"[42] When Rudolf's pharmacist husband died in 1878, leaving her to rear their two small sons, she sought pharmacy education for herself. The pharmacy program of the Medical College of Louisiana refused her admission. To maintain the store which was her livelihood, she hired a pharmacist who instructed her for three years in compounding and dispensing. She then applied to the Louisiana State Pharmacy Board, which denied her permission to take the examination required for practice. Rudolf carried her case to the Louisiana Supreme Court, which ruled in her favor. She then took and passed the examination. Later, at Tulane, she earned what has been called the first Master of Pharmacy degree awarded to a woman. This first known woman pharmacist of the South became Secretary of the Louisiana State Pharmaceutical Association in the 1890s.[43]

The notable business record of M. Cora Dow (1868-1915) of Cincinnati constitutes another striking career launched by a woman who chanced to inherit the family drugstore. Dow's father died while she was in her teens, leaving her with a drugstore "so small that one could reach the pills with one hand and the striped sticks of candy on the opposite side of the store with the other hand." Relinquishing her desire to study music, she hired a clerk to tend the store while she studied at the Cincinnati College of Pharmacy. She received her degree in 1888, at the age of nineteen, and afterward devoted her energies wholly to the family business. "For four years I ate my meals in the

Miss M. CORA DOW, Cincinnati, Ohio.

When her father's early death left her to manage the tiny family drugstore, M. Cora Dow took a pharmacy degree (Cincinnati College of Pharmacy, 1888) at the age of nineteen. By singleminded application, she acquired five stores by 1897 and ten by 1910, creating one of the early pharmacy chains in the United States. (Photo reproduced from The Pharmaceutical Era 43 *(May 1910), p. 489.)*

store. I did messenger work, janitor work, bookkeeping and stenography." She owned five stores by 1897 and ten by 1910, with 163 employees, a payroll of $2,000 per week, a wholesale plant, warehouse and an ice cream plant.[44]

Except for those who inherited pharmacies from husbands or fathers, women found it harder to get practical training than academic pharmaceutical education. One reason for this was continuing resistance to the idea of women engaging in "gainful work" in violation of the "natural" boundaries of "woman's sphere." Another was the belief that the public would have no faith in a woman prescriptionist. In 1890, in an article called "Fair Pharmacists a Failure," one male pharmacist bluntly announced that he would not pay five dollars a month for the services of "the best woman druggist you could produce." In fact, he would not even let her work for nothing. The druggist's business, he reasoned, comes from people who want advice about matters for which they would not ordinarily consult a physician.

> They want a remedy for headache, burns, bunions, chills, indigestion, prostration and nervousness; they come in, show their tongue, describe their symptoms and ask for a dose of something. Now these people would not go to a lady druggist. They would not trust her judgment.[45]

In short, women pharmacists simply could not be expected to administer to the common male discomforts of the Gay Nineties: "The men with the gripes would hardly go to her," nor would a social lion seek aid from a woman after overindulging in food or alcohol the night before.[46]

Another author of the period declared that, because a pharmacy was a "regular confessional," it was "No Field For Women:"

> In the regular course of his business the dispenser of pills and powders knows all about people's bodily afflictions and weaknesses, and becomes acquainted with little sins and things of that kind which the interested parties would not have the world know for anything. Then, too, he learns who paints, who powders, who eats opium, who uses belladonna to brighten the eyes, or arsenic to whiten the skin, who is obliged to use insect powder at home and various things of that kind, which would be too great a temptation for a talkative woman to give away.[47]

It remained for a woman pharmacy student of our own era to state the nub of the matter: "What is so rare as a woman selling condoms?" With earnest

commitment to ideals of service, this student added that selling condoms is as much a part of pharmacy practice as cautioning a patient about adverse drug reactions: "Both can be done by women."[48]

In the late 1800s, when many male pharmacists refused to accept women as apprentices, sixty-five graduates and undergraduates received practical training with Dr. Susan Hayhurst (1820-1909). Raised in a Quaker home in Bucks County, Pennsylvania, amid abolitionist activity and concern for women's rights, Hayhurst began to teach in Quaker schools at the age of sixteen. Soon after the Female Medical College of Pennsylvania opened at mid-century, she enrolled there in order to perfect her knowledge of chemistry and physiology (the better to teach her students). In 1857 she instead took a medical degree in the sixth class to graduate from the new school. After more teaching, she became pharmacist of the college's clinical facility, the Woman's Hospital of Philadelphia, a post she held for thirty-three years. It is probably more than coincidence that her work as chief pharmacist of the hospital began in 1876, the year when the college first offered its medical students the course in "Practical Pharmacy" already mentioned. Indeed, it seems likely that it was Hayhurst's presence that made the course offering possible. Although already expert in pharmaceutical skills, she sought formal credentials by enrolling in the Philadelphia College of Pharmacy, becoming its first woman graduate in 1883.[49]

Like the pioneering women physicians of the United States, the early women pharmacists occasionally found outspoken male defenders. One of Hayhurst's teachers, the famous Joseph Remington, used to boast that she was "the first woman in the world to fulfill all the requirements for graduation in pharmacy."[50] At the ninth annual commencement of the Kansas City College of Pharmacy, a faculty spokesman stated his belief that "not alone to men, the supposed lords of creation, is it necessary and benefiting to seek higher spheres of education." Asserting the right of women to enter any existing profession, he stated that "they will make just as good pharmacists as the men. I would advise those who think otherwise to go to the drug store--buy a package of flaxseed meal, make a poultice and put it on their heads, and begin to grow a set of nineteenth-century brains."[51]

The debate about women in pharmacy raged through the pages of pharmacy journals during the 1890s, as women became more numerous in the profession. Many defenders dwelt, as Dr. Yardley had done in 1853, on woman's "natural" qualifications for pharmacy: neatness, deftness and conscientious attention to detail. To the charge that the work was too heavy for women, one man

Near the end of her long career, Susan Hayhurst, wearing the dark Quaker clothing that was her hallmark, poses with some of the many women she taught. A graduate of the Female Medical College of Pennsylvania in the 1850s, and the first women to graduate from the Philadelphia College of Pharmacy (1883), Hayhurst served for nearly three decades as pharmacy director at the Woman's Hospital of Philadelphia, the clinical facility of the Woman's Medical College of Pennsylvania. She probably assisted Joseph Remington in teaching the college's course in "Practical Pharmacy," introduced in 1876 for medical students. At the Hospital Dispensary she provided some sixty-five pharmacy graduates and undergraduates with the practical training which pharmacists needed for licensure, but which was generally denied to women at that period. (Photo courtesy of Archives and Special Collections on Women in Medicine, Medical College of Pennsylvania.)

answered that the "drawing of oils and handling of mortars was not harder for a woman than a common washing, ironing and baking."[52]

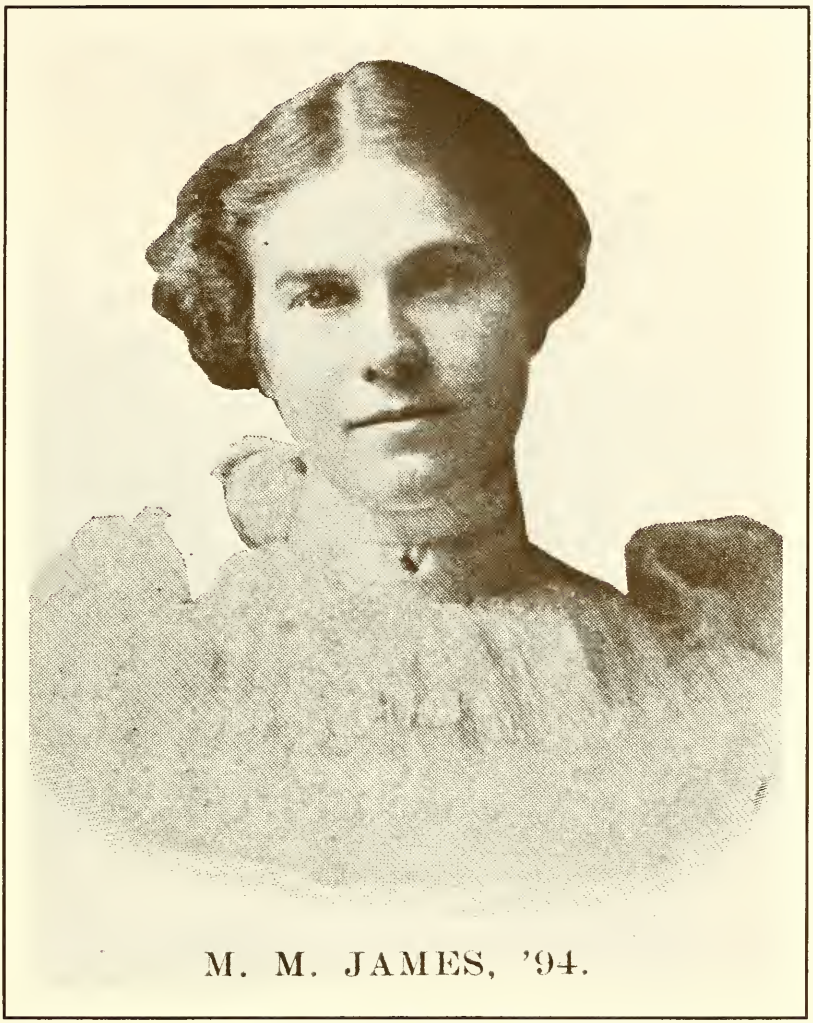
At the 1898 meeting of the Wisconsin Pharmaceutical Association, Martha Morris James summed up the feminist position in the title of her presentation: "That a Woman Makes as Good a Pharmacist as a Man, Providing They Have Equal Advantages." In support of her view, she quoted a spirited woman physician from South Dakota on the competence of women for pharmacy:

> If the opposer would call up our way, the perpetual sunshine of Dakota (which shines alike on men and women) will disperse the fog in which that dear man is floundering. He will find a thriving drug store that has never sold intoxicants nor tobacco in any form and which is owned and controlled entirely by a little woman who compounds, dispenses, manufactures and manages all the financial details, possessing the confidence of the community in her business capacity, integrity and pharmaceutical skill.

This physician saw historical justice in women's entry into professional pharmacy.

> A great light burst upon the world when the science of pharmacy swung back to its original home, the hand of woman, and its rays are melting away much prejudice, solving one more problem for science and women. Women apothecaries once were examined by learned physicians and were given the right to prepare and sell drugs. Many of them enjoyed a high reputation in the business until the jealousies of men drove them out. A few are still inclined to keep them out. It may be that woman-kind smarting under the lash, because of her sex, may rise in the might of her intellect and triumphantly march on to victory, bearing aloft the banner awarded for high degree of intelligence.[53]

In actual fact, many of the early women in pharmacy, like the pioneering women doctors, made impressive intellectual showings in competitive examinations. It is not surprising that these early professionals should do well: several studies made in the 1970s have supported the commonsense notion that, even with the support of the women's movement, a higher degree of motivation generally characterizes women entering these fields than men who make the same career choices.[54] It is reasonable to infer that women needed an equally high level of motivation a century ago, when they had to face almost universal opposition to their aspirations.



M. M. JAMES, '94.

The career of Martha Morris James of Oshkosh, Wisconsin, like her earnest young face, belies the stereotype of frivolity and lack of commitment that long plagued women in pharmacy. Apprenticed to Oshkosh pharmacists as soon as she finished high school, James entered the University of Wisconsin in 1893, taking her pharmacy degree three years later. In 1897-98 she held a U.S. Pharmocopoeia Revision Fellowship at Madison, graduating with a B.S. in Pharmacy in 1898. Her publications include both Ph.G. and bachelor's theses and several additional papers, among them her eloquent feminist statement, "That a Woman Makes as Good a Pharmacist as a Man, Providing They Have Equal Advantages." In 1900 she became proprietor of a pharmacy in Michigan. Her sister, who also was graduated in pharmacy at Wisconsin, subsequently launched a career in dispensing and teaching. (Reproduced from The Badger Pharmacist. *Madison: University of Wisconsin School of Pharmacy, 1900, p.169).*

Ranking high in competition with men actually may have done more to antagonize opponents than to disarm them: a recent historian of women physicians in the United States suggests that superior academic performance by women medical students may have contributed to the backlash which followed the first movement of women into medicine.[55]

More effective than proof of intellectual capacity was the public demonstration of women pharmacists at work during the World's Columbian Exposition in Chicago in 1893. The Model Pharmacy, entirely managed and operated by women, was an elaborate exhibit, the size of an actual pharmacy of that day. Although generously endowed with an appropriation of $3,000 from the Illinois Woman's Exposition Board, the Model Pharmacy originally was allotted only an eight-by-twelve-foot room in the Women's Building at the fair. When officials of the sponsoring organization, the newly formed Woman's Pharmaceutical Association of Illinois, considered the actual dimensions of an 1890s drug store, they arranged instead to use a much larger room--fifteen by forty feet--in the Illinois Woman's Hospital Pavilion. The Pavilion, constructed in April 1893, also housed an emergency ward and a hospital exhibit prepared by the Illinois Training School for Nurses.[56]

With an exclusive concession for dispensing pharmaceutical goods at the 1893 Exposition, the Model Pharmacy's managers (pharmacy graduates Jean Gordon, Ida Hall and Viola Griswold) had no difficulty furnishing and stocking their spacious second site. A Boston firm furnished natural mahogany fixtures, including a handsome, eleven-foot-long prescription case, with oak leaf decorations, beaded moldings and Ionic columns. The counters, showcases and shelves were carved in the finest architectural style of the day. Atop the columns and panel divisions were relief figures simulating the mermaid.[57]

Like any well-equipped drug store of the period, the Model Pharmacy had a reference work at hand--the work, in fact, which eventually became one of the most widely known pharmacy texts in the world. Joseph P. Remington (1847-1918) had personally supplied a copy of his *Practice of Pharmacy*, first published in 1885. At the time of the fair, Remington had long been Professor of the Theory and Practice of Pharmacy at the Philadelphia College of Pharmacy (where he taught Susan Hayhurst) and was about to become Dean there. An associate editor of the *United States Dispensatory* and a member of the committee on revision of the *Pharmacopoeia* of the United States of America, he was one of this country's most influential supporters of women in pharmacy.[58]

A showcase for women in action as pharmacists, the Women's Model Pharmacy at the Columbian Exposition in 1893 held the best of pharmaceutical supplies and equipment, provided by firms from around the nation. The mahogany cases contain the standard range of chemicals, pills, tablets, effervescent salts and digestive ferments, fluid and powdered extracts, surgical dressings, plasters, beef extracts, glycerine, wines, and "a complete line of Homeopathic remedies." As a special educational feature, the Model Pharmacy displayed "a very interesting collection of different varieties of opium [then an unregulated over-the-counter drug as well as a prescription medicine], from crude to finished product, with samples arranged to show the most frequent adulterations." (Reproduced from The Pharmaceutical Era, *Nov. 1, 1893, p. 428).*

Although women had arranged earlier displays of pharmaceutical products, there had never been a better showcase of their own professional activity than their working exhibit at the Columbian Exposition of 1893. The standing exhibit at the Louisville College of Pharmacy for Women, and the one mounted at the 1876 Great Centennial Exhibition in Philadelphia (where the "pharmaceutical display" of the Woman's Medical College was "very well received"), were static arrangements of furniture and medicines and pharmaceutical tools, simply intended for viewing, like museum exhibits.[59] The 1893 exhibit was a living, working model pharmacy, where real women pharmacists rendered actual service to the three thousand or so Exposition visitors who became sick or suffered some form of injury during their visit to the "White City" along Lake Michigan. Having showed women health professionals in action, in front of hundreds of thousands of visitors throughout the six months of the fair, the Woman's Model Pharmacy carried away a gold medal at the close and is said to have inspired the formation of the first association of women pharmacists in the United States.[60]

In the following decades women continued to enter pharmacy in increasing numbers. They also entered more often into professional associations, both in established male organizations and with groups of their own creation. By 1898 women were officials of state pharmacy associations in Kansas, Nebraska and Louisiana, and in 1896 the American Pharmaceutical Association elected Mary O. Miner as vice president. Although the Woman's Pharmaceutical Association of Illinois (the earliest American organization of women pharmacists) ceased to exist soon after seeing the Woman's Model Pharmacy triumphantly through the 1893 World's Fair, another Woman's Pharmaceutical Association was founded in Chicago in 1903, initially intended as the nucleus of a national organization. During the first decade of the present century, women formed their own section of the National Association of Retail Druggists (NARD) and started organizations in Pennsylvania and in the Pacific Coast region. In 1912 a New York group formed the American Woman's Pharmaceutical Association, hoping, like the earlier Chicago group, to expand eventually to national membership.[61]

Few of these groups survived for long. Like women in other professional fields during this period, women in pharmacy disagreed on the importance of segregating by sex. Many were content with minority status within predominantly male groups. In at least one notable instance, stereotyping membership by sex without regard for professional involvement brought about organizational collapse. This is apparently what happened to the Women's Section of the American Pharmaceutical Association, formed in 1912 under bylaws requiring that its membership include two groups with divergent goals.

WORLD'S COLUMBIAN EXPOSITION.

The attention of yourself and friends is invited to the exhibit of the Woman's Pharmaceutical Association of Illinois, in the special building, located west of the Woman's Building, where there will be a complete pharmacy for the compounding of prescriptions and dispensing of remedies to the public; together with a display of pharmaceutical apparatus, tablet machines, etc.

JEAN GORDON, Manager.

IDA HALL ROBY, Ph. G., Pres.

VIOLA A. GRISWOLD, Ph. G., Sec.

All three women in charge of the Model Pharmacy were somehow involved with pharmacy in Illinois. Viola Griswold was a graduate of the Illinois College of Pharmacy. Ida Hall Robey subsequently became president of the Illinois Women's Pharmaceutical Association. Jean Gordon, one of the most prominent women pharmacists of that era, held a degree from the Philadelphia College of Pharmacy (1891). For fourteen years following her successful management of the World's Fair project, Gordon ran a thriving prescription pharmacy in the Marshall Field Building. She later served as pharmacist at several Chicago hospitals, closing her active career at Grant Hospital. (Reproduced from "The World's Fair: The Woman's Pharmacy," in The Pharmaceutical Era, *May 15, 1893, p. 467).*

Women pharmacists at the Atlantic City Meeting of the A.Ph.A., September, 1916. Seated, Miss Helen Ritz Burns, Lewiston, Pa.; Miss M. Grace Truby, Pittsburg, Pa.; Miss Mabel Barnhill, Bethel, N.C.; Miss Zada M. Cooper, Iowa City, Ia.; Miss E. Grace Lotz, Baltimore, Md.; Miss M. C. Starr, Philadelphia; Miss Sylvia C. Alacan, Havana, Cuba. Standing, Miss Jamella Fox, Philadelphia, Pa.; Mrs. J. C. Peacock, Philadelphia; Miss Susannah G. Haydock, Philadelphia; Mrs. St. C. R. Gray, New York; Miss B. Olive Cole, Baltimore; Miss A. M. Patterson, Baltimore; Mrs. C. H. LaWall, Philadelphia; Miss Antonio M. Garrigo, Havana, Cuba; Mrs. Hampton Ray Kenaston, Bonesteel, S. Dak. (Reproduced Courtesy of American Druggist, *a Hearst Business Publication.)*

Pulled in different directions by wives of members, who saw the section as a social tool, and by women pharmacists, who expected it to serve professional purposes, the section ceased to exist by 1923.[62]

Between 1900 and 1920, as the American Medical Association began severely limiting the number of medical students in the nation, women seeking careers in the health professions poured into pharmacy, nursing and medical social service. Of these, pharmacy alone was considered, as was medicine, a "male" field. Although pharmacy journals of the period displayed increasing hostility to women (in 1912 one of them called the new breed of professionals "pharmasisters"), visible efforts to limit the number of women studying pharmacy, comparable to those then evident in medicine, did not arise until later.

In England a book appeared in 1918 with the title *How to Become a Dispenser: A New Profession for Women.* Not a do-it-yourself guide despite the title, this volume describes educational programs then existing in England and examinations required for qualification at various professional levels. It also included practical advice for setting up and running a shop.

Agatha Christie's autobiography indicates that she was one of the British women who took up the study of pharmacy in this period. Now best remembered for her sixty-eight novels, one hundred short stories and seventeen plays, Dame Agatha reveals in this work, published in 1977 after her death, that her early experiences in pharmacy influenced her development as a writer.

Christie began work in a London hospital dispensary in 1914, when influenza left her too weak for the nursing work she had intended to do during the war. With the aid of two women doctors who raced her through the periodic table, atomic weights and the ramifications of coal-tar derivatives, she prepared for the Apothecaries Hall Examination which would qualify her to make up drugs to be dispensed by a medical officer or chemist. With great good humor, Christie's autobiography recalls this period of training. She blew up the dispensary's Cona coffee machine while practicing Marsh's test for arsenic. She became an odoriferous family outcast at periods when she was compounding cod liver oil ointment. She took to eating her meals at home from a tray in the pantry, to spare her family the smell of iodoform after she had been making Rip's wound paste (bismuth and iodoform worked into a liquid paraffin paste).

It was also during Dame Agatha's pharmacy training that she first thought of writing the mystery stories that have made her famous:

> Unlike nursing, where there always was something to do, dispensing consisted of slack or busy periods. Sometimes I would be on duty alone in the afternoon with hardly anything to do but sit about. Having seen that the stock bottles were full and attended to, one was at liberty to do anything one pleased except leave the dispensary. I began considering what kind of a detective story I could write. Since I was surrounded by poisons, perhaps it was natural that death by poisoning should be the method I selected. [63]

Although American women who operated drugstores in this period did not have the slack periods that released Agatha Christie's fertile imagination, a good number of them managed to write for publication nonetheless. During the "roaring twenties" that opened with the passage of women's suffrage, a number of proud women pharmacist-entrepreneurs wanted to tell the world about the highly individualistic independent establishments they had created. Many of these pharmacies found a form of immortality in Emma Gary Wallace's long-running column on "Women in Pharmacy," published in *The Pharmaceutical Era*.[64] Others appeared in such features as the *California Retail Drug Journal's* "Little Journeys to the Stores of Successful Women Pharmacists."[65]

Believing that women who run drugstores 'get a slant on the business no man can ever get," editors at the *American Druggist* offered fifty dollars for the "best acceptable article by a Woman Druggist." Two Arkansas women operated their respective drugstores under such diametrically opposing philosophies of business that the *American Druggist* pitted their stories against each other in the same issue: Catharine Rhinehart's "I Give a Lot of Service" versus Ethel Duvall's "I Don't Give Any."[66]

At her "modern and up to the minute" store in the larger community of Arkansas City, Duvall employed five people, but she handled all prescriptions personally--in addition to writing fresh newspaper advertising daily, buying merchandise, and attending to her customers, most of them women. "They demand attention and I've got to give them all of mine in order to keep theirs."[67]

Rhinehart did things differently. At her small-town drugstore in Phillipsburg, she offered to locate the doctor ("and haul him to your place, if

Catherine Rhinehart:
"I Give a Lot of Service"

Ethel Duvall:
"I Don't Give Any."

(*Both photographs have been reproduced from* American Druggist, *February 1928, p. 38. Courtesy of* American Druggist, *a Hearst Business Publication.)*

necessary"); to sell stamps or babysit parcels or lend the telephone or an umbrella.

> If your automobile breaks down within ten miles of our place, tell us how many people you have and we'll send a coupe for two or a sedan for six or a truck to haul your baggage.
>
> If it's made we have it; if it isn't, we'll make it. When ordering from our store by phone, if you want us to get something from some other store, tell us; we'll get anything from a spiked-tooth harrow to a boiled dinner--and deliver it.[68]

Rhinehart also offered more traditional pharmaceutical services: "we carry everything from a mild laxative to a clap of thunder."[69]

In the thriving western community of Denver, Clara Stanton, a graduate of Colorado College and the University of Colorado School of Pharmacy (and a former faculty member at both), founded a prosperous business on the idea that "only a woman can know a woman's needs." Although she prided herself on her reputation for meticulous care with prescriptions and refused to have a soda fountain, confectionery cases or magazine racks, she interpreted her feminist mandate very broadly indeed. She made her own line of cosmetics, blended her own perfumes and conducted a large business, by mail and in person, in the anti-fat tablets which she compounded herself. She boasted "the most complete line of sanitary rubber appliances to be found in Denver" and displayed them in a special conference room at the back of her store, "where the customer may select and purchase them in privacy." (Although it is not possible to be certain from this brief passage, it seems likely that this reference is to contraceptive devices, particularly diaphragms, which just then were becoming available at the early birth control clinics in such cities as New York City and Chicago. Because the American Medical Association still held that there was no safe and effective mechanical form of birth control, few physicians would prescribe diaphragms at that time.) In the *American Druggist* article describing her business, the author relates that "this unique store of Miss Stanton's has been copied by other women druggists in different parts of the country with more or less success and it has been necessary for her to trade mark her slogan--'"I Am For Women."'[70]

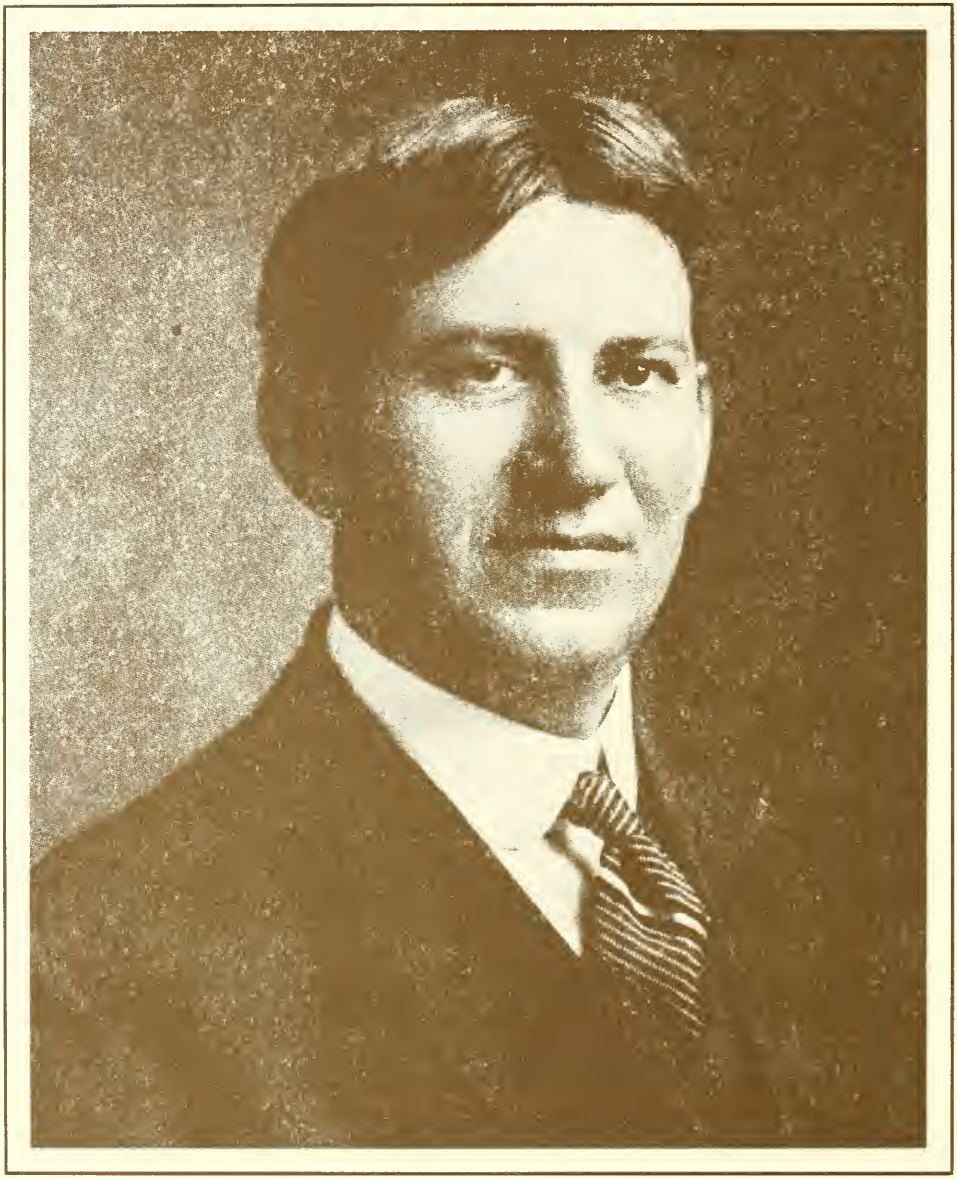
Although women often took lowly and strenuous jobs in pharmaceutical manufacturing, few trained women pharmacists managed to enter the pharmaceutical industry which, like metallurgy, was still considered a male bastion.[71] Large numbers of graduates continued, as they had since the

nineteenth century, to find hospital pharmacy an appealing form of practice, perhaps because it offered regular hours and a highly professional work environment. Articles about American women in hospital pharmacy--by Charlotte Stimson, Bertha Ott and Frances Greenwalt, for example--began appearing in the professional literature as early as the decade before World War I.[72]

The Depression of the 1930s ended the first surge of women into pharmacy in the United States. The Century of Progress Exhibition of 1933, also held in Chicago, differed markedly from the Columbian Exposition forty years before in that it gave no notice to women's accomplishments. Hard times reduced all questions about professional equality to one dimension: whatever jobs there were must go to "legitimate breadwinners," then still assumed to be exclusively male. Employers should hire women only for jobs that men would not take. Throughout the thirties this message came to officials of the Association of American Colleges of Pharmacy (AACP) in the form of mounting complaints about inordinate numbers of women with pharmacy degrees flooding an already overcrowded marketplace. As in the thirteenth century with Jacobe Felice, men were anxious to prevent women from "putting their sickle into another's harvest."

The influx of women into pharmacy had apparently persisted even after the AACP lengthened the curriculum, successfully eliminating the two-year course in 1925 and the three-year course in 1932. At its 1936 meeting the association received a report showing that women had been entering the profession at the rate of 6.95 percent in 1931, 13.1 percent in 1932, 12.9 percent in 1933, 8.4 percent in 1934 and 13.5 percent in 1935. The executive committee reported that in 1936 most member colleges had enrolled only a little over 10 percent women, although the rate was generally increasing and was very much higher (perhaps 25 percent) in the Philippines and Puerto Rico.[73] Because of reported difficulties in finding employment for so many woman pharmacy graduates, the AACP set up the Committee on the Status of Women in Pharmacy, to study the numbers entering the profession, their "adaptability," and "what attitude the association should take towards this question." Speaking for itself, the executive committee said: "We may question the wisdom of women entering pharmacy, but when they apply for admission we cannot refuse if they meet our entrance requirements."[74]

Rufus Lyman, founding editor (1937-1955) of the *American Journal of Pharmaceutical Education* and Dean of the University of Nebraska College of Pharmacy since 1913, was himself an advocate of women in pharmacy. He bluntly described the new group as the "Committee on the Menace of Women



Longtime Dean of the University of Nebraska College of Pharmacy, Rufus Ashley Lyman was a strong supporter of women in pharmacy. He fostered the aspiration of all three of his daughters to enter the profession and provided space for women pharmacists to voice their opinions in the American Journal of Pharmaceutical Education, *of which he was the founding editor (1937-1955). (Reproduced from* Journal of the American Pharmaceutical Association 5 *(Oct. 1916): 1016, with permission from American Pharmaceutical Association.)*

to Pharmacy" and published an item with the facetious title, "The Editor's Crime":

> The Editor is charged with criminal negligence. He is the father of three daughters, all pharmacists, and that they present a problem to pharmacy. Editor admits daughters have presented problems as girls, but not as pharmacists. Editor asked that the matter be referred to President Roosevelt for girl control measures. Association refuses and refers whole matter to the Committee on Study of Menace of Women to Pharmacy. Dr. Nellie Wakeman comes to Editor's support. She said--"I can see how something which looks like a problem may be created by over-much discussion. If many of the well-intentioned friends of women would leave them alone to work out their own solutions, some of their problems would be eliminated, not only in pharmacy, but in other occupations as well." (Editor feels better.) [75]

The "Doctor Nellie Wakeman" Lyman mentioned had long taught pharmaceutical chemistry at the University of Wisconsin. At the request of the president of the Association of American Colleges of Pharmacy, she had agreed to serve on the committee studying women in pharmacy, although, as she explained in an article Lyman asked her to write for the second issue of the *American Journal of Pharmaceutical Education*, she did not really believe that women constituted a problem for the profession.

As she revealed in her article on "Women in Pharmacy," Nellie Wakeman accepted without complaint, as the natural order of the life she had always known, the fact that "men have the best of it." Even with the relatively evenhanded treatment women received during their college years, men had the advantage of the traditions and practices of our man-made institutions, "ordained by men for men." Because she recognized that men had this built-in asset, she was especially proud that the Wisconsin School of Pharmacy had enrolled more than twice the national average of women (22.1 percent) and that the women pharmacy students there earned slightly higher grades than the men.[76]

If women had more difficulty finding jobs in pharmacy than men did, the same was true throughout the working world. This, too, Nellie Wakeman accepted. "Whenever a woman comes into competition with a man, she must not only be as good but considerably better than the man who wants the same job. Even then the chances are about ten to one that it will be given to the man, and if the woman does get it, her salary will probably be less than that paid to men for the same work."[77]

Wakeman further believed that male solidarity, "sort of a loyalty of man to man" which seemed to increase with competition in any given field, frequently caused "the employment of a man, clearly inferior in every respect, in preference to a better qualified woman." Despite all the handicaps to women which she saw operating in 1936, she predicted that women would continue, in growing numbers, to seek education and employment in pharmacy.[78]

Nellie Wakeman was unduly optimistic. When the committee on the Status of Women in Pharmacy polled member schools of the AACP, only six stated that women should be encouraged to enter the field. A few expressed concern about a surplus of women in pharmacy. Thirty-six replied that it was not the business of the association to take any position in the matter.[79]

The percentage of women among pharmacy students at Wisconsin fell from 22.1 in 1936, at the time of Wakeman's prediction, to 14.3 in 1971. On a national scale the percentage of women among pharmacy students had fallen to 9.4 by 1951. At the University of Illinois, where thirty-seven women pharmacy students appear in a photograph taken around 1930, there were only eight in the entire College of Pharmacy by 1948.

The decline of women in medicine was even more marked. Women pulled back from professional pursuits in all fields between the 1930s and the 1970s, for a variety of reasons historians and sociologists are only now beginning to understand--although one of the causes acknowledged by all scholars is the failure to promote outstanding women through the academic ranks.

Nellie Wakeman's career provides a perfect example. Her educational credentials included two advanced degrees: an M.S. in 1910, with a thesis on the phytochemistry of the Monardas; and a Ph.D. in 1913, with a dissertation in pharmaceutical chemistry--possibly the first Ph.D. in pharmacy awarded to a woman.[80] She chaired the Mills College Department of Chemistry before joining the University of Wisconsin faculty where, in 1917, she published a text on plant chemistry. Although she was a superb teacher, devoted to her work, she remained at the rank of instructor from 1913 to 1927 and at assistant professor from 1927 to 1948.[81] The University of Wisconsin School of Pharmacy repeatedly requested her promotion, but, each time, higher administration refused to promote her. Paid a total of $2,750 in 1940, Nellie Wakeman taught twelve-week summer sessions during World War II, for $275 per summer. She was ultimately tenured at the assistant professor level and held that title at her retirement in 1948, after thirty-five years of dedicated teaching. Yet her loyalty to Wisconsin was such that she left the university a bequest to be used for scholarships named in her honor.[82]

This photograph, taken just before the Great Depression put an end to the first movement of women into pharmacy, shows thirty-seven women students in the laboratory of the University of Illinois School of Pharmacy (College of Pharmacy after 1932). In 1930-31 the school was housed in a renovated building that later became the Old Illini Union, on Wood Street just north of Polk Street. It had fifty-five women students out of a total enrollment of 682. (Photo courtesy of University of Illinois Archives, Urbana.)

Nellie Wakeman's example is not unique: similar stories could be compiled from college and university personnel files everywhere in the United States. Nor is such discrimination a long-vanished phenomenon. Women in academic pharmacy have continued to encounter low pay and slow promotion. In a survey in 1973, the Association of American Colleges of Pharmacy found only sixty-two women (4.8 percent of all pharmacy faculty in the United States) at or above the level of assistant professor: as one task force member stated, "the report on the status of female faculty members has presented a rather dreary picture."[83]

The impression has long persisted that women pharmacists are less professionally dedicated than men--and more likely to drop work in favor of family life, stereotyping all but a few women out of consideration for administrative, managerial and entrepreneurial positions. A spate of studies done in the late seventies and early eighties revealed that, despite Title VII of the Civil Rights Act (as amended in 1972); despite Executive Order 11246 and affirmative action programs in American colleges and universities; despite a great increase in the number of women boasting doctorates in pharmacy, women's work histories continued to be characterized by low salaries and low status.[84] A landmark study of practice patterns, conducted in 1979 among 624 pharmacists who graduated between 1961 and 1978, showed that, on average, the women earned $1.72 per hour less than men, and that only 8.9 percent of women, compared to 60.4 percent of men, earned more than $20,000 yearly.[85]

In part because of these continuing symptoms of discrimination, the board of trustees of the American Pharmaceutical Association established the Task Force on Women in Pharmacy in January of 1979. Reporting in the spring of 1981, this task force emphasized the importance of increasing the number of academically qualified, tenure-track female faculty.[86] The question in 1981 was no longer whether women would continue to become pharmacists but, rather, how they best could contribute to the future development of the profession.

The APhA Task Force recommended that women pharmacy students be given more women role models in pharmacy faculties, and that women graduates be encouraged to pursue advanced degrees to qualify themselves for such work; that an office of women's affairs be created by the American Pharmaceutical Association to provide better communication for women pharmacists; that the profession develop some means for gathering and reporting manpower data (a measure first urged by Nellie Wakeman in 1936); that pharmaceutical associations encourage the involvement of women in committee work and in leadership positions; that academic counselors make

Nellie Wakeman typifies the woman in academic pharmacy whose lifetime passes without promotion commensurate with her performance. Wakeman served on the faculty of the University of Wisconsin School of Pharmacy for thirty-five years. Despite publications and a superb teaching record, and despite efforts by the School of Pharmacy to secure her promotion, the University of Wisconsin administration kept her at the rank of assistant professor until her retirement in 1948. (Photo courtesy of American Institute of the History of Pharmacy.)

women pharmacists more aware of the professional avenues open to them, more fully integrating women into pharmacy ownership and management; that various pharmacy recruitment materials place more stress on full-time opportunities for career-oriented women of the 1980s and that advertisements portraying pharmacists use women in that role.[87]

In 1980 the National Association of Retail Druggists (NARD) estimated that, although six hundred women then owned drug stores, many--if not most--of them were in partnership with their husbands. Even in the relatively wide-open frontier of Alaska in 1980, one woman pharmacist-owner believed that "bankers have done more than any group to hold back women entrepreneurs."[88] For that reason, and because women were still sometimes the last to be accepted for practical training, she emulated Susan Hayhurst's policy from a century earlier, training and hiring only women at her two large professional pharmacies.

NARD recognized that, without encouragement to overcome existing barriers to ownership, women would continue to be more likely to enter hospital than community pharmacy, and so it formed its own task force in 1981. Among its objectives were the formation of programs to help women become independent retail pharmacy owners and the creation of a support network for women pharmacists. The key issues singled out by the task force were: stabilizing career patterns; equalizing opportunities for advancement; solving problems of professional re-entry after maternity leave; and overcoming credibility barriers with other pharmacists and with the public.[89]

Unlike the Depression-era APhA Task Force on Women in Pharmacy, which debated whether it should encourage or discourage the study of pharmacy by women, the various task forces of the 1980s have addressed specific ways to remove obstacles to the full development of women in the profession. In response to efforts to attract them into academic pharmacy, women responded in numbers comprising 16.7 percent of all pharmacy faculty in 1986-1987.[90]

Women in pharmacy are no longer mockingly called "pharmasisters" or "pharmacettes," as they sometimes were in the twenties.[91] They are no longer designated "Pharmisses," as they were in 1950, in a Walgreen in-house publication which explained that "Pharmacy and Femininity make a pleasing combination." Nor does Walgreen any longer use the word "Phar-Mrs," to show that women can "compound" marriage and career--provided that the career involves no more than working under someone else's direction at a pharmacy.[92]

Young women entering pharmacy today are more self-assured than their elders were. Whether or not they plan to have families, they want work that both challenges and rewards. In increasing numbers they are applying themselves to the arduous study of clinical pharmacy, preparing to deal directly with patients and physicians as active participants in health care which is being organized increasingly as a team effort.[93]

Those experts who venture predictions for the woman pharmacist of the future see her, by the year 2000, in a wide range of important and fulfilling roles. She will serve as information specialist to persons selecting over-the-counter drugs, to physicians in community and hospital practice, and to patients who are receiving prescriptions. She will be involved with patient care in institutional settings and beyond, reviewing drug records in community pharmacies, conducting hospital rounds, reviewing patients' charts to guard against drug incompatibilities, and monitoring and encouraging compliance. She will become a community drug advisor and educator, teaching young people about the proper use of drugs and the dangers of abuse. She will provide family planning advice and information about methods of fostering or preventing conception. She will provide and coordinate pharmaceutical services, advising the physician in selecting and prescribing drugs--and she herself will sometimes assume responsibility for drug selection and prescription.[94]

In a sharp departure from history, and even from the relatively recent past, the 1980s have brought a new message: Women have become an important part of pharmacy. The profession is seeking ways to promote their involvement to the full extent of their capacity and commitment.

It appears that today's sisters of Hygeia are about to come into their own at last.[95]

Julius Breitzmann, a Berlin apothecary, brought this giant mortar to Sheboygan, Wisconsin, when he emigrated in 1848. In 1882 it came into the hands of Max Zaegel, who exhibited it (as "the oldest mortar in the state") at a Sheboygan meeting of the Wisconsin Pharmaceutical Association in 1895. (Reproduced from The Badger Pharmacist. *Madison: University of Wisconsin School of Pharmacy, 1900, p. 14.)*

NOTES

1. "Female Undergraduate Degrees Boomed from 10.7% to 30.1% of Total!" *Pharmacy Times 43* (April 1977):33; Norma Libman, "Women in Pharmacy," *Illinois Pharmacist 43* (January 1981): 8; Metta Lou Henderson and Tammy Lynn Keeney, "Women Faculty Members: Changing the Face of Pharmacy Education," *American Pharmacy NS28* (May 1988):19.

2. Kate Campbell Hurd-Mead, *A History of Women in Medicine: From the Earliest Times to the Beginning of the Nineteenth Century* (Haddam, Connecticut: The Haddam Press, 1938), 15, 18, 19, 20, 21, 32, 50.

3. *Ibid.*, 29-32.

4. *Ibid.*, 36 and 49.

5. Glenn Sonnedecker, typescript "History of the Bowl of Hygeia" and excerpt from an unpublished account, "Emergence of the Bowl and Serpent as a Symbol of Pharmacy," both in the Kremers Reference Files, F. B. Power Pharmaceutical Library, University of Wisconsin, Madison.

6. Hurd-Mead, *History of Women in Medicine*, 37 and 228.

7. *Ibid.*, 37.

8. *Ibid.*, 45-46 and 306.

9. *Ibid.*, 127-132, 185-188 and 271; H. J. Mozans, *Woman in Science: With an Introductory Chapter on Woman's Long Struggle for Things of the Mind* (Cambridge, Mass. and London: MIT Press, 1974), 278, 285 and 289-290.

10. Hurd-Mead, *History of Women in Medicine*, 419-423.

11. *Ibid.*, 413.

12. *Ibid.*, 412.

13. Hurd-Mead, *History of Women in Medicine*, 413.

14. *Ibid.*, 416.

15. *Ibid.*, 488.

16. Robert W. Culp, "The Education, Career Opportunities and Status of American Women Pharmacists to 1900, Including a Directory," *Transactions of the College of Physicians of Philadelphia (1973):212.*

17. *Ibid.*

18. *The Druggist's Circular 51*(1907):151.

19. Culp, "Education, Career Opportunities;" Mary Roth Walsh, *"Doctors Wanted: No Women Need Apply": Sexual Barriers in the Medical Profession, 1835-1975* (New Haven and London: Yale University Press, 1977); Regina Markell Morantz-Sanchez, *Sympathy and Science: Women Physicians in American Medicine* (New York and Oxford: Oxford University Press, 1985).

20. Barbara J. Harris, *Beyond Her Sphere: Women and the Professions in American History* (Westport, Connecticut: Greenwood Press, 1978).

21. Ronald L. Numbers, "Do-It-Yourself the Sectarian Way," in *Medicine Without Doctors: Home Health Care in American History*, Guenter B. Risse, Ronald L. Numbers and Judith Walzer Leavitt, eds. (New York: Science History Publications, 1977), 58.

22. Quoted in Regina Morantz, "Nineteenth Century Health Reform and Women: A Program of Self-Help," in *Medicine Without Doctors: Home Health Care in American History,* Guenter B. Risse, Ronald L. Numbers and Judith Walzer Leavitt, eds. (New York: Science History Publications, 1977), 90.

23. Thomas H. Yardley, M.D., *Thirty-Fifth Annual Report of the Northern Dispensary for the Medical Relief of the Poor, No. 1 Spring Garden Street. Instituted October 1, 1816. . .Chartered March 26, 1817. Also, The History and Statistics of the North Dispensary* (Philadelphia: Joseph Rakestraw, Printer, 1853), located in the Division of History of Medicine of the National Library of Medicine. I am grateful to John Parascandola, Chief of the Division of the History of Medicine, for calling this material to my attention.

24. Sarah Stage, *Female Complaints: Lydia Pinkham and the Business of Women's Medicine* (New York: W. W. Norton, 1979); James Harvey Young, "Lydia Estes Pinkham," in vol. 3 of *Notable American Women, 1607-1950*, Edward T. James, Janet Wilson James and Paul S. Boyer, eds. (Cambridge, Massachusetts: Belknap Press of Harvard University Press, 1971), 71-72.

25. Eunice Bonow Bardell, "America's Only School of Pharmacy for Women," *Pharmacy in History 26* (1984):127.

26. Roy Lubove, "Mary Putnam Jacobi," in vol. 2 of *Notable American Women, 1607-1950*, Edward T. James, Janet Wilson James and Paul S. Boyer, eds. (Cambridge, Massachusetts: Belknap Press of Harvard University Press, 1971), 263-265.

27. Glenn Sonnedecker, "Women as Pharmacy Students in 19th-Century America," *Veröffentlichungen der Internationalen Gesellschaft für Geschichte der Pharmazie ns 40* (1973):136-137; Culp, "Education, Career Opportunities." For a comprehensive review of the development of pharmacy education and its regularization in the United States, see Glenn Sonnedecker, *Kremers and Urdang's History of Pharmacy*, 4th edition, revised (Philadelphia and Toronto: J. B. Lippincott Company, 1976), 226-254.

28. Metta Lou Henderson and Tammy Lynn Keeney, "Women in Pharmacy Education: The Pioneers," *American Pharmacy NS28* (May 1988):24.

29. Sonnedecker, "Women as Pharmacy Students," 135.

30. Quoted in Ruth J. Abram, "Give Her Knowledge: The Class of 1879 in Training," in *"Send Us a Lady Physician": Women Doctors in America, 1835-1920*, Ruth J. Abram, ed. (New York and London: W. W. Norton & Company, 1985).

31. Patricia Spain Ward, "Hannah E. Myers Longshore," in vol. 2 of *Notable American Women, 1607-1950*, Edward T. James, Janet Wilson James, and Paul S. Boyer, eds. (Cambridge, Massachusetts: Belknap Press of Harvard University Press, 1971), 426-428.

32. Undated transcript of a talk by Dr. Longshore, in Hannah E. Myers Longshore manuscripts in Archives and Special Collections on Women in Medicine, Medical College of Pennsylvania.

33. *Ibid.*

34. Ward, "Hannah Myers Longshore," 428.

35. Undated transcript of Longshore talk (note 32).

36. Culp, "Education, Career Opportunities," 214.

37. Sonnedecker, "Women as Pharmacy Students," 137.

38. Walsh, *"Doctors Wanted, No Women Need Apply;"* Morantz-Sanchez, *Sympathy and Science.*

39. Sonnedecker, "Women as Pharmacy Students," 137-138; Bardell, "America's Only School of Pharmacy for Women," 129.

40. Bardell, "America's Only School of Pharmacy for Women," 131-132.

41. Quoted in Culp, "Education, Career Opportunities," 216.

42. William P. O'Brien, "Pharmacy's 'Sufferettes': Women in Pharmacy," *The Louisiana Pharmacist* (January 1970):12-13.

43. Culp, "Education, Career Opportunities"; O'Brien, "Pharmacy's 'Sufferettes'," 12-13.

44. Interview with M. Cora Dow in *Pharmaceutical Era 43* (May 1910):489-490.

45. Quoted in Culp, "Education, Career Opportunities," 216.

46. *Ibid.*

47. *Ibid.*; *American Analyst 3* (1887):142. I am grateful to Rima Apple for this reference.

48. Letter from Anne Donovan, SAPhA Region 7 Delegate, in "Student APhA" Section, *Journal of the American Pharmaceutical Association NS13* (November 1973):644.

49. Joseph W. England, ed., *The First Century of the Philadelphia College of Pharmacy 1821-1921* (Philadelphia: Philadelphia College of Pharmacy and Science, 1922), 164; Bertha Ott, "Women in Hospital Pharmacy," *Journal of the American Pharmaceutical Assocation 5* (June 1916):590-592; Bertha Ott, "Hospital Pharmacy and Its Opportunities," *Journal of the American Pharmaceutical Association 15* (1926):391-394; newspaper clippings and biographical materials about Hayhurst from Archives and Special Collections on Women in Medicine, Medical College of Pennsylvania.

50. Typescript Report of Committee on Necrology of the Alumni Association, Woman's Medical College of Pennsylvania, 1910, located in Archives and Special Collections on Women in Medicine, Medical College of Pennsylvania.

51. Quoted in Culp, "Education, Career Opportunities," 217, from News Notes, *Pharmaceutical Era 12* (1895):292.

52. Martha Morris James, "That a Woman Makes as Good a Pharmacist as a Man, Providing They Have Equal Advantages," *Proceedings of the Wisconsin Pharmaceutical Association* (1898):33.

This photograph shows Sisters of Mercy at work in the newly remodeled pharmacy of St. Francis Hospital in New York City. From the Middle Ages until recent times, notable numbers of women in religious orders chose pharmacy as their path of service. (Reproduced from Drug Topics, *September 8, 1952. Courtesy of Kremers Reference Files, F. B. Power Pharmaceutical Library.)*

53. *Ibid.*, 34.

54. Kenneth W. Kirk and Richard A. Ohvall have studied a number of attributes of contemporary women pharmacists: motivation, practice patterns, attitudes toward continuing education. For examples see the November 1973 issue of the *Journal of the American Pharmaceutical Association* (devoted wholly to women) and the February 1973 and February 1975 issues of the *American Journal of Pharmaceutical Education*, as well as the September 1972 issue of the *American Journal of Hospital Pharmacy*. In 1979-1981 Kirk served as Director of the APhA Task Force on Women in Pharmacy.

55. Walsh, *"Doctors Wanted, No Women Need Apply,"* 199-200.

56. Jeanne Madeline Weimann, *The Fair Women: The Story of the Woman's Building, World's Columbian Exposition, Chicago, 1893* (Chicago: Academy Chicago, 1981), 449-450; "The World's Fair: The Woman's Pharmacy," *Pharmaceutical Era 10* (1893):428-429.

57. *Ibid.*, "The World's Fair."

58. Ivor Griffith, "Joseph Price Remington," in vol. 15 of *Dictionary of American Biography* (New York: Charles Scribner's Sons, 1935), 497-498; Sonnedecker, *Kremers and Urdang*, 284-285, 482.

59. Abram, "Give Her Knowledge," 145-146; Bardell, "America's Only School of Pharmacy for Women," 129.

60. Weimann, *The Fair Women*, 450; "The World's Fair"; Libman, "Women in Pharmacy," 8.

61. Culp, "Education, Career Opportunities," 219.

62. Eunice R. Bonow, "The Women's Section of the American Pharmaceutical Association," *American Journal of Pharmaceutical Education 17* (1953):383-388.

63. Agatha Christie, *An Autobiography* (New York: Ballantine Books, 1977), 300.

64. For some time before joining the staff of the *Pharmaceutical Era* in 1908, Emma Gary Wallace wrote about technical and literary subjects for the popular and widely circulated magazine, the *Delineator*. In announcing her hiring to "conduct a regular department for the benefit of the women of the drug trade," the *Era* (*42* [September 24, 1908]:398) said she would write for the wives of druggists, not for women pharmacists. In a column sometimes appearing as often as twice monthly for almost twenty years, Wallace did both. She covered social events and offered business advice to women who worked with their druggist-husbands, but she also reported on pharmacy education for women and on state legislation detrimental to women pharmacists. She frequently urged women pharmacists to involve themselves in civic affairs as experts on matters affecting health.

65. See for example *California Retail Drug Journal 3*(October 1921):26.

66. *American Druggist* (February 1928):38-39.

67. *Ibid.*, 39.

68. *Ibid.*, 38.

69. *Ibid.*

70. Ida Brenn Feeney, "A Drug Store for Women Only," *American Druggist* (January 1923):24-25.

71. Margaret W. Rossiter, *Women Scientists in America: Struggles and Strategies to 1940* (Baltimore and London: The Johns Hopkins University Press, 1982), 253.

72. Christie, *Autobiography*; Ott, "Women in Hospital Pharmacy"; Ott, "Hospital Pharmacy"; Charlotte E. Stimson, "The Field for Women Pharmacists in Hospitals," *Journal of the American Pharmaceutical Association 2* (1913):1288-1289 .

73. American Association of Colleges of Pharmacy, "Report of the Executive Committee," *American Journal of Pharmaceutical Education 1* (1937):66-68.

74. *Ibid.*

75. Rufus Lyman, "The Editor's Crime," *American Journal of Pharmaceutical Education 1* (1937):209.

76. Nellie Wakeman, "Women in Pharmacy," *American Journal of Pharmaceutical Education 1* (1937):146-150.

77. *Ibid.*

78. *Ibid.*

79. American Association of Colleges of Pharmacy, "Report of the Committee on the Status of Women in Pharmacy," *American Journal of Pharmaceutical Education 2* (1938):69-71.

80. Henderson and Keeney, "Women in Pharmacy Education," 26.

81. Nellie Wakeman, biographical folder, Kremers Reference Files, F. B. Power Pharmaceutical Library, University of Wisconsin, Madison.

82. *Ibid.*; author's interview with Arthur Uhl, Dean Emeritus of the University of Wisconsin School of Pharmacy, September 25, 1978.

During World War II women replaced men in businesses and offices and factories on the home front. They also entered several new branches of the armed forces: the Women's Army Auxiliary Corps (the WAACs, formed in 1941, succeeded by the Women's Army Corps, or WACs, in 1943); the Women's Air Force Service Pilots (WASPs), formed in 1942; the Women Accepted for Voluntary Emergency Service (WAVEs), also formed in 1942; and the United States Marine Corps Women's Reserve (USMCWR), formed in 1943. This photograph of a WAVE at work in a wartime hospital laboratory appeared with an apparently unrelated article reporting an army colonel's discovery that "insurmountable technical difficulties" would forever prevent the use of bacteria, bacterial toxins, and viruses as weapons of war. The author, Gobind Behari Lal, who was Science Editor of the International News Service, also reported that University of Minnesota researchers had found that honey, when given to chicks, has anti-hemorrhagic properties likely to make it useful in military medicine. (Reproduced from "Show Globe of Tomorrow's Science," American Druggist 108 *(September 1943):76. Courtesy of* American Druggist, *a Hearst Business Publication.)*

83. Sheila West, "Women in Pharmacy: Some Predictions for Women Students and Faculty," *Drug Intelligence and Clinical Pharmacy 9* (August 1975):414.

84. "Women Say Stereotypes Block Them from Pharmacy's Best Careers," *American Druggist 175* (June 1977):60-61; "Women Pharmacists: Ready for a More Active Role?" *Drug Topics 121* (August 15, 1977):41-43, 58; Eugenia S. Carpenter, "Women in Male-Dominated Health Professions," *International Journal of Health Services 7* (1977):191-207; Carol L. Kronus, "Women in Pharmacy: Trends, Implications, and Research Needs," *Journal of the American Pharmaceutical Association NS17* (November 1977):674-679; "34% of Women RPHs Experienced Employment Discrimination," *Pharmacy Times 44* (October 1978):88, 90; Metta Lou Henderson, "A Descriptive Survey of Women Pharmacy Faculty Members," *American Journal of Pharmaceutical Education 43* (August 1979):191-194; Jere Goyan, "On the Emergence of Women in Pharmaceutical Education," *American Journal of Pharmaceutical Education 43* (August 1979):300-301; "Women Pharmacy Graduates Outnumber Men in 5 States," *American Druggist 180* (September 1979):48; "Pharmaceutical Industry Female R&D PhD Growth Third Highest Among All Industries, NRC Study Reports: Salaries, Promotion Rates Still Lag Behind Men," *The Blue Sheet 23* (April 16, 1980):19-21; Edgardo A. Mercadante, Joseph L. Fink, III, and Arthur A. Nelson, Jr., "Practice Patterns of Male and Female Pharmacists," *Contemporary Pharmacy Practice 4* (Spring 1981):100-106; Marvin D. Shepherd and Kenneth W. Kirk, "A 1980s Look at Women in Pharmacy," *American Pharmacy NS21* (April 1981):237-240; Marvin D. Shepherd and Kenneth W. Kirk, "Men and Women as Pharmacy Managers," *American Journal of Hospital Pharmacy 38* (October 1981):1463-1466. For a study showing that in Canada women were likely to earn less than $20,000 yearly and be employees, while men were likely to earn $20,000 or more and be owners, see Neena L. Chapell and Gordon E. Barnes, "Women in Pharmacy," *Contemporary Pharmacy Practice 4* (Winter 1981):16-21.

85. Robert Brody, "How Women in Pharmacy Are Changing the Profession," *American Druggist* (November 1980):32.

86. American Pharmaceutical Association, *Task Force on Women in Pharmacy: Final Report* (Washington, D.C., 1981), 51-53. In December 1981 the APhA also published *Abstracts of Articles Written About Women in Pharmacy*, prepared by Alan P. Wolfgang and Kenneth W. Kirk.

87. American Pharmaceutical Association Task Force on Women, *Final Report*, 7-11.

88. Brody, "How Women in Pharmacy are Changing the Profession," 32.

89. George Klinger, "More Women are Serving Pharmacy but Not in the Community Drugstore," *Drug Topics 120* (December 15, 1976):63; "Women in Pharmacy: NARD Task Force Moves Ahead," *NARD Journal 103* (April 1981):46-47.

90. Henderson and Keeney, "Women Pharmacy Faculty," 18-19.

91. Bardell, "America's Only School of Pharmacy for Women," 133, note 17.

92. "Meet Our Walgreens Pharmisses," *Pepper Pod* (March 1959):no pagination.

93. According to Henderson and Keeney, "Women Pharmacy Faculty," p. 20, women took 53.8 percent of Pharm.D. degrees as of 1986.

94. West, "Women in Pharmacy," 414; Judith M. Slining, "Women's Role in Pharmacy Practice in the Year 2000," *Drug Intelligence and Clinical Pharmacy 9* (1 975):418-419.

95. The phrase which gives this paper its title occurs in Mozans, *Woman in Science*, p. 281. Writing in 1910, Mozans noted that during the medieval period, in various parts of Europe but especially in Italy and France, there had been "many daughters of Aesculapius and sisters of Hygeia who stood in such high repute among their contemporaries that they received the same honors and emoluments as were accorded to their masculine colleagues."

In 1977, at the invitation of Professors Glenn Sonnedecker and John Parascandola of the University of Wisconsin School of Pharmacy, I began collecting material about women in pharmacy to present as a guest lecture in their otherwise comprehensive course in the history of pharmacy. I am indebted to them for directing me to many helpful materials and for commenting on an early draft of this written version. I regret that Mardie Blanchard, long-time Secretary of the American Institute of the History of Pharmacy, did not live to see the publication of these ever-growing lectures, which she supported enthusiastically over a period of four years.

Walgreen helped to defray research expenses, especially for photographic reproductions. I am indebted to Jerry Carlin and Bill Thien for their interest and support.

Others who supplied information are Bonnie Svarstad and Rima Apple of the University of Wisconsin; Michael Harris of the Smithsonian; the late Elizabeth Cabot McRoberts of Wellesley, Massachusetts; and Professor Emerita M. Joan Campbell of the Library of the Health Sciences, University of Illinois at Chicago. For help in gathering illustrations I am indebted to Maynard Brichford, Archivist of the University of Illinois, Urbana; Anita Miller of Academy Chicago Limited, Publishers; Dolores Nemec, Librarian, F. B. Power Pharmaceutical Library, University of Wisconsin, Madison; Jill Gates Smith of the Archives and Special Collections on Women in Medicine, the Medical College of Pennsylvania; and Robert J. Adelsperger, Elisabeth Wittman and Kate Hammell, of the Library of the Health Sciences, University of Illinois at Chicago.

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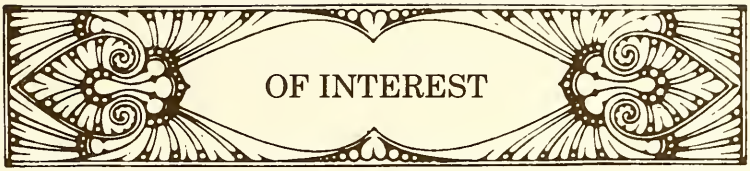
This image of Hygeia reflects the romanticizing of women frequently seen in nineteenth-century painting and sculpture. Probably created by a commercial artist to adorn the packaging of some health-related product, this Hygeia carries a banner to spell out the message that the serpent and bowl once conveyed by means of the classical symbolism of healing. (Reproduced from Women: A Pictorial Archive from Nineteenth-Century Sources. 391 Copyright-Free Illustrations for Artists and Designers, *selected by Jim Harter, New York: Dover Publications, 1978.)*

Fig. 1. R. K. Porter. Bonaparte Ordering Five Hundred Eighty of His Wounded Soldiers To Be Poisoned at Jaffa. *This was one of many caricatures used to quicken British passions against the enemy. (Reproduced courtesy of the Trustees of the British Museum.)*



The Pest House at Jaffa: Medicine, Art and French Romantic Painting

Joseph M. Merrill, M.D.
Hebbel E. Hoff, M.D., Ph.D.

In the spring of 1799 during the Syrian campaign, Napoleon made two notable visits to the hospital at Jaffa. The first, which later became the inspiration for the famous painting by Antoine Jean Gros, was made on March 11th to allay the rising fears among French troops about the contagion of the plague. The second, made on May 27th to attend to the plague-stricken troops whom he had to abandon, became the source of the story of the poisoned soldiers. Nicholas-René-DuFriche Desgenettes, the physician-in-chief, was a central figure in these two very separate visits.

French historian Charles de la Jonquière gives the best documented descripton of the May 27th visit:

> The physician-in-chief of the army [Desgenettes] must be considered *a priori* to be the more authoritarian witness to inform us of the fate of the patients who were entrusted to his care...In the first edition of *Historie Médicale*, [he] recounts the situation of the hospitals of Jaffa...If Desgenettes limits himself to implying that some thirty plague victims could not be evacuated, it is because he could not say more in 1802 when he published his *Historie Medicale*, at the invitation of the First Consul. It was only in the second edition of his work, published in 1830, that he was at liberty to make known the entire truth. There he affirms in the most formal way that before the

evacuation of Jaffa a large dose of laudanum was given to twenty-five victims of the plague.

Even before [Desgenettes] had expressed himself in such positive terms, the truth had already been established...by the often repeated declarations of Bourrienne and of Miot, who were present at Jaffa. Kleber was content to note in his personal notebook these letters as abbreviations: "On propose aux o.d.s.d.d.d.l. aux f. et b.d." A note added in pencil by General Damas interprets this: "On propose aux officers de sante de donner de l'opium (laudanum) aux fievreux et blesses dangereusement."[1]

Physician-in-chief Desgenettes recounts his version of the story in this way:

The time is come to explain an important fact...General Bonaparte called me the 27 May, early in the morning to his tent, where he was alone with his headquarters chief. After a short preamble on our sanitary situation, he said to me: In your place I would end the suffering of our plague victims and at the same time end the danger threatening us by giving them some opium.

I answered simply, my duty to myself was to conserve them. Then the general developed his mind with the greatest calm, saying that he advised for the others what in a similar case he would ask for himself. He asked me to note that he was responsible for the conservation of the army and by consequence to prevent our sick from falling alive under the scimitars of the Turks. I do not seek to vanquish your repugnance but I believe that I will find persons who will appreciate better my intention.[2]

In the 1835 version, Desgenettes concluded with this statement: "At our return to Jaffa they reported that they gave to the plague victims, to the number of 25 to 30, a strong dose of laudanum. Some of them rejected it by vomit(ing) and were relieved, recovered their health and related all that happened."[3]

Not until 1893, sixty years later, did Desgenette's full story unfold. Desgenettes recorded the more appropriate version in his memoirs: "General Berthier, leaving General Bonaparte's tent, met me and shook my hand: 'I was not going to interfere in your discussion, you were doing too well for me to interfere, I was charmed by what you said to him; you're a character my friend!' Desgenettes--'I'm very flattered by your concurrence, general; but you

could well have announced this to me during the conversation at least by a nod of the head; that wouldn't have stopped you from biting your nails.'"[4]

Louis Fauvelet de Bourrienne, Napoleon's secretary, who was also present at Jaffa, records the episode as follows:

> I will state what I know, what I saw...on the 27th of May...the General-in-Chief left his tent...accompanied by Berthier, some physicians and surgeons, and his usual staff. I was also one of the party. A long and sad deliberation took place on the question which now arose relative to the men who were incurably ill of the plague, or who were at the point of death. After a discussion of the most serious and conscientious kind it was decided to accelerate a few moments by a potion, a death which was inevitable, and which would otherwise be painful and cruel....There were scarcely 60 cases of plague in the hospital; and all accounts stating a greater number are exaggerated. The perfect silence, complete dejection and general stupor of the patients announced their approaching end. To carry them away in the state in which they were, would evidently have been doing nothing else than innoculating the rest of the army with the plague.[5]

Fig. 2. George Cruikshank. Poisoning of the Sick at Jaffa. *This was one of thirty engravings Cruikshank made to illustrate a poem which pokes fun at Napoleon. Conspiring to poison the sick at Jaffa was still a useful theme fifteen years after the incident occurred. (Reproduced courtesy of the Trustees of the British Museum.)*

Napoleon himself recalled this episode while on St. Helena and Bourrienne recorded his thoughts as follows:

> I ordered a consultation as to what was best to be done. The report...stated that there were 7 or 8 men...so dangerously ill that they could not live beyond 24 hours, and would besides infect the rest of the army with the plague. It was thought it would be an act of charity to anticipate their death a few hours....I do not think it would have been a crime to have given opium to the infected. On the contrary, it would have been obedience to the dictates of reason. Where is the man, who would not in such a situation have preferred a prompt death, to being exposed to the lingering tortures inflicted by barbarians? If my child, and I believe I love him as much any father does his, had been in such a state, my advice would have been the same; if I had been among the infested myself, I should have demanded to be so treated.[6]

Prior to the Syrian campaign, England had feared a French invasion and the report of Napoleon poisoning his own troops was too good a story for the English not to exploit it. Jonquière summarizes the English reaction in this way:

> The secrecy surrounding the distribution of opium was not so complete that the fact did not come, promptly enough, into the hands of the English. But by an amplification, spontaneous or designed to tarnish the glory of Bonaparte, the number of victims was exaggerated excessively. In his history of the English expedition in Egypt published in 1801, Robert Wilson says that "five hundred eighty soldiers...perished miserably by the order of the one who was the idol of the nation"[7]

The great English caricaturists of the day also seized the situation as opportunity. R.K. Porter's print showing Napoleon ordering his soldiers poisoned at Jaffa (Fig. 1) was recommended to readers of the *Loyalist*, dated Oct. 15, 1803. Prints and broadsides were circulated widely to stir national feeling and the attacks continued as long as Napoleon remained a threat to England. George Cruishank's engraving entitled *Poisoning of the Sick at Jaffa* (Fig. 2), describing the same atrocity with vivid derisiveness, was not published until 1814.

Napoleon at this time was in deep trouble politically. Criticism over his leaving his army and secretly departing from Egypt was on the increase; it was generally acknowledged that the Syrian expedition had been a failure for the

French military; and the report of French soldiers being poisoned were widespread. A court martial was discussed. These events set the stage for the emergence of a Frenchman to counter the charges against Napoleon. The general obviously needed a new image and Antoine Jean Gros was to be the man to supply it.

THE ARTIST

Antoine Jean Gros (1771-1835), the son of a minor artist, was born and grew up in Paris. The Gros family lived near the Lebruns; Jean Baptise Pierre Lebrun was an art dealer, and his wife, Vigée, a painter. When he was fourteen, Gros entered Jacques Louis David's studio, where he became a favorite pupil. With David's help, Gros left Paris eight years later for Italy, where he settled in Genoa but traveled to Venice, Rome and Florence. It was here, immersed in the brilliant coloring of Rubens and the Venetian school, that Gros liberated himself from the neo- classicism of the Davidian school.

In Italy other events took place that were to shape Gros' future painting and career. After meeting Josephine, he followed her to Milan in 1796 and painted *Bonaparte à Arcole*, which is acknowledged by many as Napoleon's "sincerest and liveliest" image.[8] Gros was rewarded with an appointment as "review inspector," and given a uniform, a horse and pay in order to inventory Italian works of art and to assist in choosing those destined to enrich the Louvre.

Returning to Paris in October of 1800, Gros won the government-sponsored competition for a painting of the Battle of Nazareth. His draft for this painting contained two new elements,--precise, accurate military documentation and a definite Oriental atmosphere--that were to change the direction of nineteenth-century French painting. For reasons never satisfactorily explained, Gros did not complete the Nazareth painting but upon Napoleon's order began the *Pestiférés de Jaffa.*

As one of Napoleon's chief advisors, Dominique Vivant Denon warned Gros of the necessity of having a "perfect knowledge of the place...it is, I think, the only way to depict this topic in a way that would satisfy his majesty's intentions." Desgenettes relates the March 11, 1799 hospital visit in this way:

> ...[The general] spoke with almost all the soldiers and was busy with all the details of organization for more than an hour and a half. Being in a small crowded room, he helped, or even better, carried the hideous

Fig. 3. Antoine Jean Gros. Drawing for Pestiférés de Jaffa. *(In this rough sketch Gros, by closely following Desgenettes' account of the March 11th visit to the hospital, makes the pesthouse come alive. (Reproduced courtesy of Cliché des Musées Nationaux, Paris.)*

> corpse of a soldier whose ragged clothes were dirtied by the opening of a huge infected bubo.[9]

Gros used this description to produce the drawing (Fig. 3) which was subsequently owned by Baron M. Larrey, the Surgeon-in-Chief of Napoleon's army. This drawing contains the following note, in Larrey's son's handwriting:

> This drawing of Gros is the true historical scene or the first draft of his masterpiece. It represents General Bonaparte taking in his own hands the corpse of a plague victim. He acted that way to encourage those around him. Everybody seems scared by his action. He only is calm, as his face shows it. This scene is worthier of a great man's glory than the substitution of an attitude noble in appearance ....[10]

The drawing (Fig. 3) provided the framework for the first version of the *Pestiférés* (Fig. 4). In this painting the viewer senses immediately the reality of suffering, danger, blindness and death. Closer inspection reveals the triad characterizing the plague: thirst, vomiting and abdominal pain, and weakness.[11] There is something more, though. Bonaparte, whose voice elicits the hope of a blind grenadier against the remonstrances of the Turkish nurses, courageously holds the dead body of a French soldier while his fearful chief of staff covers his face to avoid the contagion. Although good, the painting as it stood was not good enough to satisfy Napoleon's propagandist needs.

In the second version (Fig. 5), Gros fabricated a myth that did not reflect the true state of affairs reported by Desgenettes. The artist shifted his emphasis from the miseries to the glories of war. In his analysis in *Transformation in Late 18th-Century Art*, R. Rosenblum discusses this newer version:

> Calm and fearless, Napoleon enters a fetid ambiance of a pesthouse. Unlike the two generals who accompany him, Berthier and Bessières, he appears to be supernaturally immune to the stench and horror of the scene; indeed, he miraculously perpetuates the legend of the divine touch of kings by extending his healing finger to the bubo of the wretched plague victim. In earthbound contrast to this Crypto-Christian miracle, Arabs and French medical officers desperately attempt to provide food and medical care to the rotting patients in the foreground.[12]

Gros had resolved a meeting of Orient and Occident into a harmonious composition by combining humanitarian tradition, divine touch of kings, human anguish, agonies of war, and colonialism. When the second painting

(Fig. 5) was exhibited in the salon in 1804, David characterized it as an "aspect so new, so unexpected."[13] Napoleon's advisor, Denon, reported to Bonaparte in Germany that it was a "very lively and historic likeness;" and Girondet called Gros an emulator of Veronese, a rival of Titian and "the hope of the new French School."[14]

GROS' LEGACY

How did it come about that a man who never traveled further south than Rome or further east than Venice could have introduced such a profound Orientalist influence into future Western painting? For *The Pestiférés*, Gros relied on Desgenettes, Denon and Tarachery. Desgenettes supplied the story and the factual description of what transpired on Bonaparte's March 11 visit to the hospital. Denon's sketches provided the source for the Arabic costumes and physiognomy. Tarachery's drawings of Jaffa provided the physical setting for the second version. Bonaparte himself was the catalyst for Gros' translation of Desgenettes' facts into "great themes of benevolence and heroism." With Napoleon's fall from power, Gros' own works reverted to a weak and uninspiring form of academism. However, in having been responsible for initiating French romanticism in painting--a school which flourished in the nineteenth century--he achieved no small measure of success.

Delacroix summarizes Gros' contributions: "the only one who can be really called a genius was Baron Gros" and he "succeeded in raising a modern subject to the stature of the ideal."[15] In his book, *French Painting: The 19th Century*, Jean Leymarie discussed the extent of Gros' influence in these words:

> He speeded up the transition from neoclassicism (in which he had been schooled) to romanticism, of which his temperament and instincts made him a pioneer...he stayed at home and saw none of the distant battles and foreign lands which he was asked to paint, [yet] excelled all the military chroniclers of his time and produced a series of battle pictures no less admirable for their historical exactitude, vouched for by eyewitnesses, than for their purely pictorial quality. For each picture Gros documented himself with the utmost care and transposed in imagination the experience he had gained during the Italian campaign. It is, first and foremost, by virture of this visionary power, which no other of David's followers possessed, that he belongs to the romantic movement. Before Goya, Géricault and Delacroix, he renewed the artistic and moral interpretation of a particularly difficult type of painting, showing modern warfare as it really was. He laid stress on the dynamics of design, the virtue of color,

Fig. 4. Antoine Jean Gros. Pestiférés *(first version). Gros' brushwork and subdued colors portray the squalor of the military hospital and the soldiers' suffering and despair. Although this painting was unacceptable to Napoleon, it opened the way for Delacroix, Gericault and others to shape the future of French painting. (Photo courtesy of New Orleans Museum of Art: Museum Purchase through Ella West Freeman Foundation Matching Fund.)*

Fig. 5. Antoine Jean Gros. Pestiférés de Jaffa. *When shown at the Salon of 1804, this final version was crowned with laurel leaves. This monumental painting emphasizes that political pressure can determine how an artist both interprets past events and anticipates the future. Here, Gros casts aside the military disasters of the Eqyptian campaign to blazon Napoleon in his imperial role. (Reproduced courtesy of Cliché des Musées Nationaux, Paris.)*

> and concern for the general unity....It was Gros who reintroduced color as an expressive force and a connecting principle....Following his example, Géricault, Delacroix and Daumier built their works around internal masses and not in terms of contours, while his conception of color was taken over by the impressionists and Cézanne.[16]

Gros' break with neoclassicism initiated French romantic painting. As Lelievre so wisely puts it, "taste under the influence of events changes."[17] The three events which changed the course of Gros' painting were: his exposure to Venetian and Genovese color, his firsthand experiences with the horrors of war in the Italian campaign, and Napoleon's influence. It is also fair to add that the Egyptian campaign energized the development of the Orientalist movement in art. The contribution of medicine to this transformation came about because the physician Desgenettes was present and vividly recorded the March 11th visit to the Jaffa hospital. This convergence of events inaugurated a new era in French painting.

NOTES

1. See C. de la Jonquière, *L'Expedition d'Egypte, 1798-1801*, Vol. IV (Paris: Henri Charles-Lavauzelle, 1899-1907), 575-581. This particular quotation is found on p. 579.

2. This annotation is from Jonquière: "Bonaparte proposed to distribute to them a dose of opium sufficient for them not to fall alive into the hands of the Turks. He made this decision after having, it seems, deliberated with councellors less independent than Desgenettes; he found a docile agent for doing it in the Pharmacist-in-Chief of the Army, Royer, who prepared the necessary potions by means of a certain quantity of landanum provided by the Turkish physician Mustapha Hadji." For the specific quotation, see R.N.D. Desgenettes, *Histoire Médicale de l'Armée d'Orient*, ii (Paris: F. Didot, Frères, 1835), 245-246.

3. Desgenettes, *Histoire Médicale*, 246.

4. See Nicholas-René-DuFriche Desgenettes, *Remembrances of a Doctor from the Expedition in Egypt* (Paris:C. Levy, 1893), 16 [unpublished translation of Susan C. Carlson].

5. See L.A.F. Bourrienne, *The Life of Napoleon Bonaparte*, vol. I (London: H. Colburn and R. Bentley, 1831), 213-214.

6. Bourrienne, *Life of Napoleon*, 216-217.

7. Jonquière, *L'Expedition*, 580.

8. For a general view, see Pierre Lelievre, "Gros: Peintre d'Histoire," *Gazette des Beaux Arts 15* (1936):289-304.

9. Desgenettes, *Histoire Medicale* (second edition, 1830), 50.

10. H. Mollaret and J. Brossollet "A Propos des *Pestiférés de Jaffa* de A. J. Gros," *Jaarboek Koninklijk Museum voor Schone Kunsten* (Antwerp: Royal Museum of Fine Arts, 1968), 287.

11. *Ibid.*

12. See R. Rosenblum, *Transformations in Late 18th-Century Art* (Princeton: Princeton University Press, 1967), 96-97.

13. J. Lindsay, *Death of the Hero* (London: Studio Books, 1960), 116.

14. Lelièvre, *Gros*, 294.

15. For an account of Delacroix' summation of Gros as an artist, see M. Brion, *Romantic Art* (London: Thames and Hudson, 1960), 129-130; or Pierre Lelièvre, *Gros*, 297; or Jack Lindsay, *Death*, 107, 119.

16. J. Leymarie, *French Painting: The 19th Century*, James Esmmons, trans., (Cleveland: World Publishing Company, 1862), 52.

17. Lelièvre, *Gros*, 297.

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Joseph M. Merrill, M.D., was graduated from Harvard Medical School in 1948. His internship and residency in medicine were at Vanderbilt University Hospital from 1949 until 1951. Dr. Merrill took a research residency at the Veterans' Administration Hospital in Nashville from 1954-1955, and then assumed the titles of Chief of Clinical Physiology and Assistant Chief of the Radioisotope Service at that same institution from 1956-1964. He left Nashville to accept the position of Chief, General Clinical Research Centers Branch of the National Institutes of Health, where he remained until 1967.

Moving to Houston, Dr. Merrill was appointed Dean of Scientific Affairs at Baylor College of Medicine. He served as Executive Vice President of Baylor from 1970 until 1978. He currently is a Professor of Community Medicine at Baylor, and has been a consultant at The Methodist Hospital and the VA Hospital since 1967. Dr. Merrill has published widely in the areas of community medicine and medical education.

Hebbel Edward Hoff, M.D., physiologist and educator, received his bachelor's degree from the University of Washington in 1928 and then proceeded on a Rhodes scholarship to Oxford University, where he took a "first" in natural sciences and subsequently a Ph.D. in neurophysiology in 1932. He was graduated, with honors, from Harvard University Medical School in 1936.

Dr. Hoff was first an instructor and then associate professor of physiology at Yale's College of Medicine from 1932 until 1942. He left Yale to accept the title of Joseph Morley Drake Professor of Physiology and department chairman at McGill University, where he remained until 1948. In that year Dr. Hoff was appointed James Hambleton Professor of Physiology and Chairman of the Department of Physiology at Baylor College of Medicine in Houston, a position he held until 1977. Dr. Hoff died in 1987.

Fig. 5. Antoine Jean Gros. Pestiferes de Jaffa *(detail). (Reproduced courtesy of Cliché des Musées Nationaux, Paris.)*

"Westwinds," the mansion housing The Bakken, was built in 1928 for William Goodfellow, the eldest son of R.S. Goodfellow, a highly successful dry goods merchant and public figure. (Photo courtesy of The Bakken.)

The Bakken: A Library And Museum Of Electricity In Life

John E. Senior

In 1743 Johannes Kruger, professor of medicine at the University of Halle in Germany, answered a student's question about the teleological nature of electricity with the reply, "All things must have a usefulness that is certain. Since electricity must have a usefulness and because we have seen that it cannot be looked for either in theology or in jurisprudence, there is nothing left but medicine."[1]

A century and a half later, emminent French physiologist Arséne D'Arsonval was to echo similar thoughts, though more forceably so:

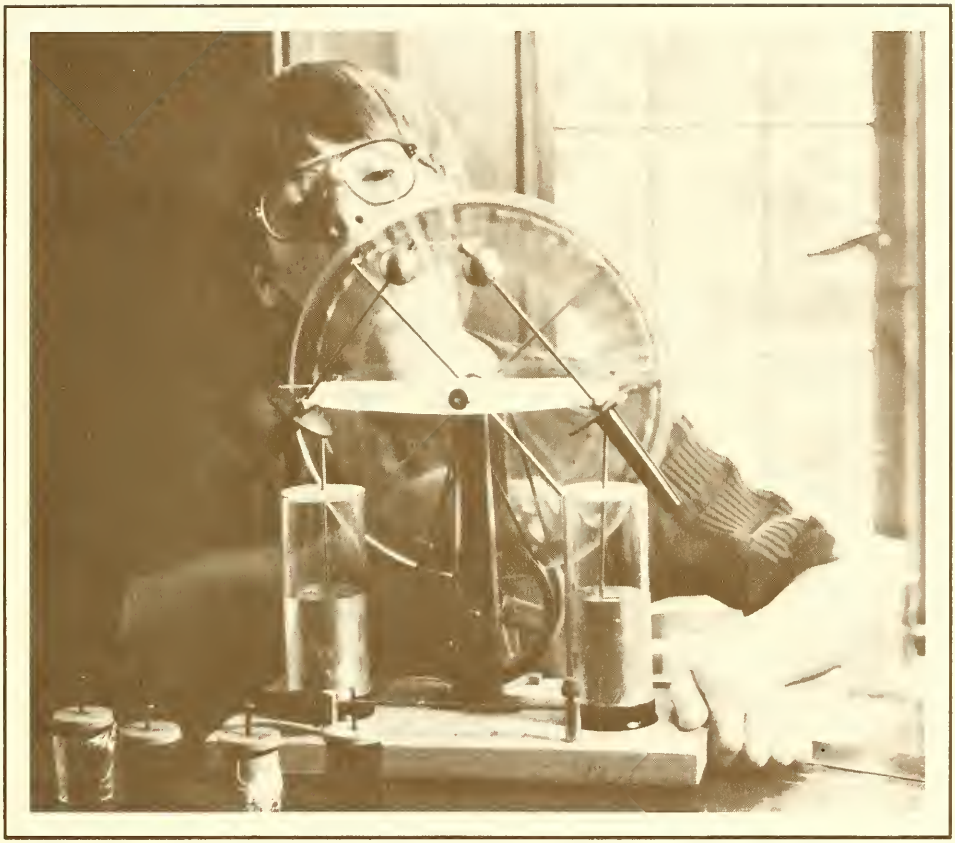
> I am convinced that the therapy of the future will employ as remedial agents physical modifiers (i.e., heat, light, electricity and agents yet unknown). Toxic drugs of chemistry shall cede their place to physical agents, the employment of which has at least the advantage of not introducing any foreign body into the organism.[2]

From these early observations inspiration has been drawn which is manifest today in The Bakken, a private, non-profit museum and library of electricity in life, containing some 12,000 rare books, manuscripts and archival material and over 2,000 instruments. It was established formally in 1976 by Earl Bakken, the institution's eponym, an electrical engineer who developed the first wearable cardiac pacemaker and co-founded the Minneapolis-based bioengineering firm, Medtronic, Inc.

Much like the private cabinets of an earlier period, The Bakken's museum and library came into being as an assemblage of objects intended to stimulate curiosity and inquiry about the natural world. In 1969 Earl Bakken, then president of Medtronic, requested the company's librarian, Dennis Stillings, to research the history of the pacemaker for a short introduction to his presentation at the annual general meeting. Thinking that the early uses of electricity in medicine would not go back further than the turn of the century, Bakken was much chagrined to find the history of electrotherapy had no neat and tidy beginning, but could in fact be traced back to the ancient Greeks and Romans. [3] Bakken directed Dennis, therefore, to search for "some old medical electrical machines" and later "old medical electrical books."

At this time there was no established market for such devices as medical electrical instrumentation and much ingenuity was needed to dig up "such pieces of junk." Eventually, European dealers in rare books on science and technology became the most reliable sources for such devices--at a price. However, the provenance of one of the largest collections of instruments acquired in a single lot did not have the imprimatur of the sophisticated European dealer, but came instead from one of a very different cast--Tropical Trader of Miami Beach. "Trader Joe" had excellent things to sell, including a large Toepler-Holtz static machine and a very early electrocardiograph unit. He claimed that his electrical collection came from a doctor living in Morelia, Mexico, who was a descendant of the last Mexican emperor, Iturbide. This scientifically enlightened emperor, deposed in 1815 by Santa Anna, earlier had set about collecting a private "cabinet scientifique" importing many scientific instruments from Europe including a Voltaic pile contemporary with Volta (1800). The Morelia doctor owned the remains of this collection, as well as other nineteenth- and twentieth-century medical electrical devices of his own. One device in his possession, a Neuroisco E.N.T. (ear, nose and throat) device, which dates from about 1920, had been used on his wife and children for over twenty years. Today at The Bakken, the Neurisco machine, demonstrating the functions of violet ray therapy and high- and low-voltage electrostimulation, is our chief hands-on exhibit for visitors.

In somewhat similar circumstances a collection of some eighty instruments came to The Bakken, this time from London. The late antiquarian, Heinz Nordon of London, had located "an amazing collection of electrical apparatus owned by a gypsy in Peckham who had rings in his ears and long, greasy, black hair"--not your average antique dealer. The collection, originally of some four hundred electrical motors, generators, coils and electrical toys, dating from the eighteenth century on, was housed in a run-down, three-story house of which only the top floor was habitable. Eventually, The Bakken acquired eighty or so



Discharging a modern Himshurst electrostatic generator. Children's workshops at The Bakken allow exploration of basic concepts in electricity and magnetism. (Photo courtesy of The Bakken.)

instruments which had something to do with electrotherapy and electrophysiology.

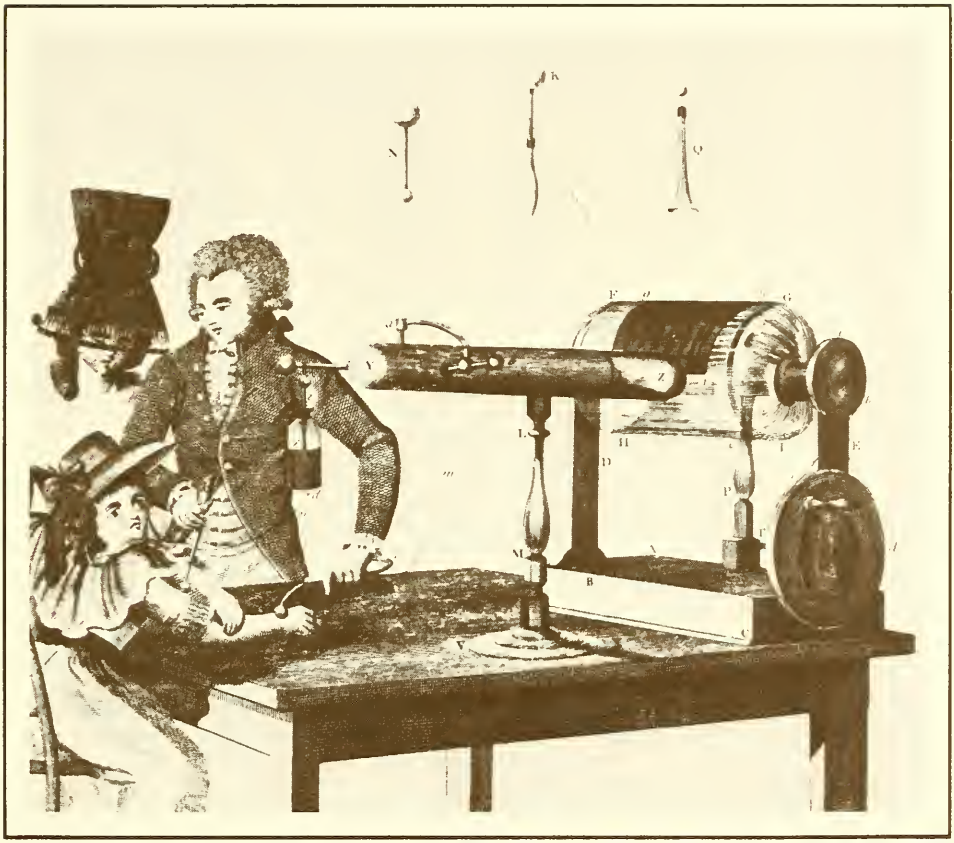
Important to the development of the museum's collections was the role of certain instrument dealers, and later, book dealers. The doyen of French dealers, the late Alain Brieux, located and offered to The Bakken items of exceeding beauty and rareity--a D'Arsonval induction cage, a Guilleminot spiral, a signed coil of Duchenne du Boulogne, a glass harmonica made by Benjamin Franklin, and a variety of instruments important to the history of medical and physiological instrumentation.

Instruments remain mute without their literary context. It quickly became evident that books, archival materials, trade catalogs and ephemera such as advertising flyers, etc., also should be collected. Covering such fields as electrotherapy, electrophysiology, biomagnetism, mesmerism, neurology and medical quackery, the collections presently date from 1270, the date of a manuscript of Vincent of Beauvais, the *Speculum Naturale*, to an approximate cut-off date of about 1940. The research component of the library was enhanced greatly in 1985 when complete runs of the *Philosophical Magazine*, the *Annalen der Physik*, and the Royal Society's *Philosophical Transactions, and Proceedings*, were acquired, all in fine condition.

Although the library was collected as a resource for research purposes, it contains some outstanding rarities. In addition to a number of incunabula, there is a first printed edition of Peter Peregrinus' *De Magnete*, dated 1558, the rare offprint of Galvani's *De Viribus Electricitatus*, 1791, and Robert Norman's *The Newe Attractive* of 1581.

Jeremy Norman of San Francisco played a key role in development of the library's special collections. One of his finds included a number of superb Mesmer animal magnetism manuscripts and, from a century later, a large selection of manuscript material of Albert Abrams, the founder of the radionics movement. Over two hundred ephemeral items (advertisements, programs, broadsides, circulars, and instructional pamphlets of an electrotherapeutical character and some three hundred trade catalogs, mostly from the period of 1875 to 1930 round off this intriguing component of the collections. Although no catalogue of the book collection has been published, a listing of The Bakken's collection of trade catalogs has been published recently in Davis and Dreyfuss's *The Finest Instruments Ever Made*.[4]

Researching The Bakken's unique subject matter has revealed important original discoveries such as that DC (Direct Current) defibrillation was used



Treating the forearm with "commotion"-shocks from a Leyden jar connected to a cylinder-type electrostatic generator. (Reproduced from George Adams' An Essay on Electricity, *1785.)*

Battery of Leyden jars from the eighteenth century. The Leyden jar was the first electrical condenser. (Photo courtesy of The Bakken.)

as early as the 1770s, that electroacupuncture, and low voltage stimulation for bone healing were well-known methods throughout most of the nineteenth century, and that electrical control of the heart rate was accomplished by direct stimulation of the myocardium in the 1860s. All of these therapeutic modalities are in vogue today.

Housed in a 1920s Tudor Gothic style mansion on the shores of Lake Calhoun, the exhibition galleries of The Bakken (2,300 square feet) reflect the strength of the collections. The galleries, none of which are self touring, incidently, are roughly divided into the following: 18th Century Electrical Science and Electrotherapy; Rare Books Exhibition Area; the Franklin Room; the Graphic Method Room--depicting the rise of recording devices in nineteenth-century physiology and medicine; the Quack Room (renamed the Alternative Medicine Room); the Doctor's Office of electromedical devices from the early twentieth century; the Coil Room of nineteenth- and twentieth-century diathermy devices; and last but not least, electrical fish, illustrating not only the antiquity of electrotherapy but also demonstrating the complexities of electrophysiological phenomena. Offsite exhibition areas include the American College of Cardiology's Heart House, in Bethesda, Maryland, where an exhibit on "Early Modern Cardiology" is currently on display.

From the eighteenth century onwards, doctors were quick to apply the latest discoveries in electrical science and The Bakken's galleries focus on the interconnection between science, technology and medicine. The development of the electrostatic generator in the eighteenth century gave rise to the medical use of electrostatic shocks called "Franklinization;" the discovery of the voltaic pile gave rise to the therapeutic application of the battery called "Galvanism;" the discovery by Oersted and Faraday of electromagnetic induction gave birth to "Faradism," the medical use of the dynamo; the demonstration of the existence of electromagnetic waves by Hertz led to the development of diathermy.

On tour of the Eighteenth-Century Room, one will find that three forms of therapy were available to the eighteenth-century electrician. They were the *electric bath*, the *method of sparks* and *commotion*. Therapists considered electricity to be a vital fluid circulating along the nerves. The electric bath involved filling a person or the entire room with electricity in an attempt to recharge the vital fluid. Sparking and commotion were attempts to clear blockages in the nerves, thus allowing the electric fluid to circulate more freely. Also on display is a reproduction of what may be the first defibrillator described by Charles Kite in 1788. In the basement the Graphic Method

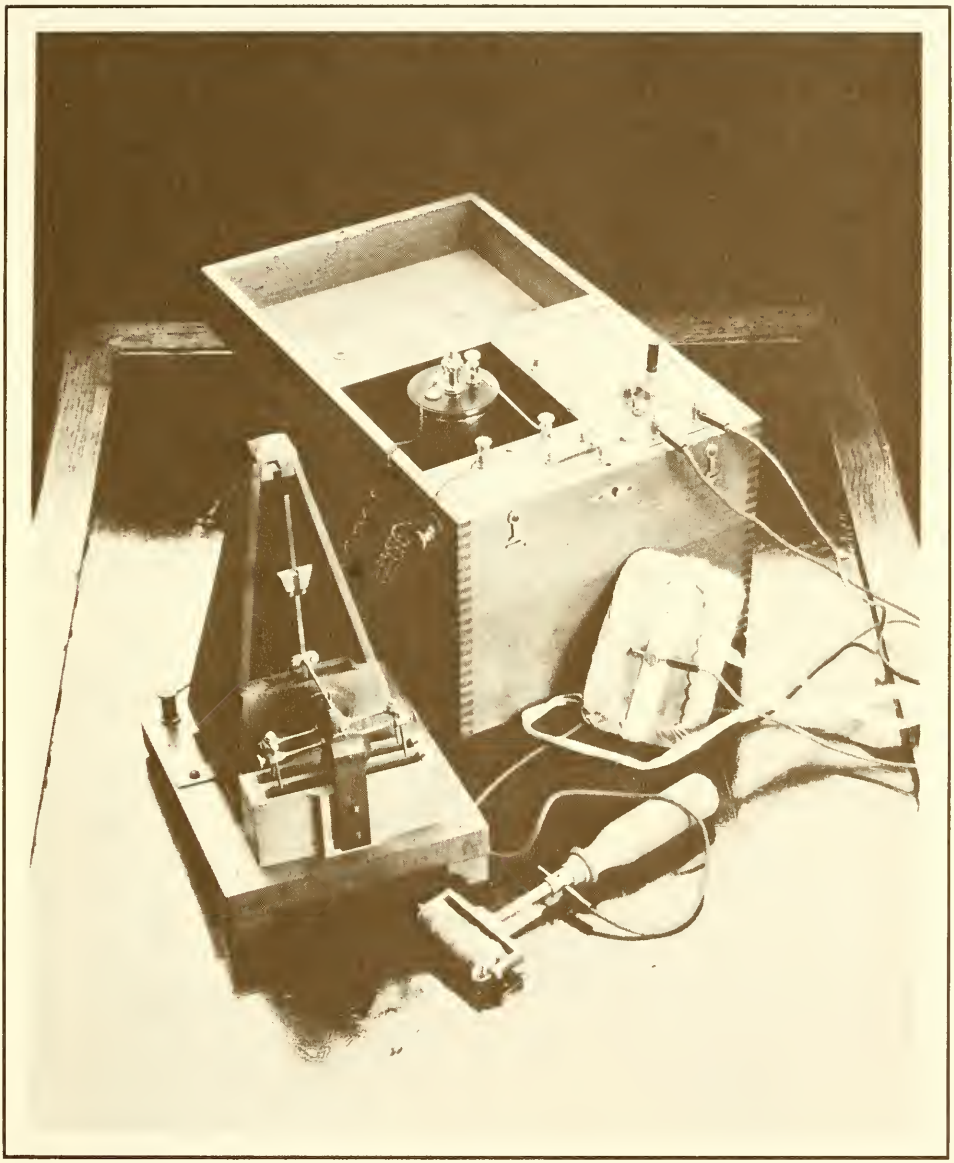
exhibit features the development of the kymograph and its use in physiological recording. The kymograph inscribed permanent records of the pulse and muscular movement. The development of the galvanometer for measuring minute bioeleclectrical currents led to the development of the string galvanometer electrocardiograph and other medical recorders. The star object of display in this gallery is a 1918 American model electrocardiograph by Cambridge.

Also in the basement is the Quack Room, or Alternative Medicine Room. Electricity always has seemed mysterious and the electric shock often has appealed to the quack for its startling yet relatively safe effect. On view are a few electrical wonder cures, such as a coin-operated "Electricity is Life" machine. Of a more dubious nature is the hemodimagnometer of Dr. Albert Abrams. It was at the turn of the century that scientists discovered that colors of light differed in their frequency of vibration. Abrams proposed that all disease was a result of bad vibrations. Simply by putting a sample of blood in his hemodimagnometer, he claimed to be able to diagnose the disease vibrations. A cure was a simple matter of reversing a dial 180 degrees. His favored diagnosis was "bovine syphilis."

On the top floor, The Bakken's galleries include the Doctor's Office and Coil Room. In the former is the Neurisco Machine, and other electromedical devices from the early twentieth century. Of note is a metronome switch which was used for rhythmic stimulation in early pacing experiments.

Adjoining the Coil Room are numerous medical induction coils from 1845 to 1910. The prize of this collection is a design by Duchenne du Boulogne, the "father" of electrophysiology. In the Coil Room itself, a large Toepler-Holtz electrostatic generator functions as both a power supply for x-ray tubes, a means of ionizing therapy, "Static breeze," and a neuromuscular stimulator for physical therapy. D'Arsonval and Oudin coils used in whole body and localized diathermy function by means of a battery, a Ruhmkorff coil, to create high frequency current and spark-gap oscillator. Such radiowave generators are the precursors of the modern microwave oven.

The historical nature of The Bakken's collections provide a context for recent educational programs. Since 1984 summer institutes for secondary science teachers focus on the "Art of Experimentation." By deliberately juxtaposing the experimental and the historical, teachers can learn about the structure, methods, range and concepts in modern science. During three weeks of intensive instruction, participants build and use facsimiles of historical apparatus in order to recreate important discoveries in such fields as



Nineteenth-century meronome switch circuit provided pulses of current to pace the heart and study muscles. (Photo courtesy of The Bakken.)

electricity, magnetism, optics and acoustics. In such a fashion, teachers learn about the role of experiment in the creation of scientific knowledge. For the participant the course is attractive, offering four University of Minnesota graduate credits, a stipend and an opportunity to work in a contemplative, aesthetic environment.

A public lecture series on biomedical ethics provides the focus for our other major educational program at present. This lecture series grew naturally out of the Bakken's concern for creating a community forum for the exchange of health-related ideas pertinent to modern society. Drawing on a rich supply of local speakers, the themes of the various series--usually six lectures in each--have included such titles as "Ethical Dilemmas in Health Care for the Elderly," "Medical Technology and Moral Concerns," and "Human Gene Therapy, Prospects, Promises and Problems."

Apart from its scientific role in the community, then, The Bakken acts as a lively cultural resource. A visit to The Bakken also may include a concert by The Bakken Chamber Players, a theatrical performance or a dramatic reading by local performers. Receptions, meetings, small conferences and news about The Bakken's collections are announced regularly in The Bakken's *Electric Quarterly*, a local newsletter available free on request.

In keeping with The Bakken's commitment to developing new science programs and public outreach in general, a membership program supplements the funding of The Bakken. With the exception of these memberships and grants from public and private foundations, monies from rental of the Bakken's facilities, and admission donations, the funding of The Bakken is provided strictly by the Earl E. Bakken Foundation.

All the new activities at the Bakken have raised a problem of space. (The Bakken's total area, including offsite storage, is 10,855 square feet.) A 1920s Tudor gothic style mansion, after all, is not the ideal building to house an institute for twenty teachers and their students. Long-term plans for The Bakken, therefore, include exploring the possibilities of a 15,000 square-foot addition to the current building, or relocating to a different site. Aside from bricks and mortar, we plan to continue cooperative programming in science education with the University of Minnesota and develop joint exhibition programs with the Science Museum of Minnesota.

As The Bakken evolved from a repository for books and instruments in the history of electromedicine to an active learning center, it has also seen a modification in staff and governance. The Bakken's Board of Directors, of

Nineteenth-century Guilleminot spiral. When connected to a generator, it beamed microwaves for diathermy. (Photo courtesy of The Bakken.)

which Earl Bakken is the Chairman, now is larger and better balanced between business and academia. The museum's full time staff of eight has grown to include both a full time tour guide coordinator (*cum* administrative assistant) and a science educator to run the summer institute and other workshops throughout the year. Currently the Bakken is open Monday through Friday from 9:00 am to 5:00 pm, and averages approximately 5000 visitors a year.

The Bakken's resources are unduplicated anywhere and no serious student in the history of electromedicine can afford not to pay a visit. With the recent resurgence in the therapeutic application of electricity, due in part to disillusionment with the excess of chemotherapy and renewed interest in holistic ideas in medicine, the Bakken's collections underscore that fruitful relationship between the physicist and the physician.

1. For a discussion, see E. Snorrason, *C. G. Kratzenstein and His Studies on Electricity during the Eighteenth Century* (Odense, Denmark: Odense University Press, 1974),12.

2. Bourguignon, G. "Professor D'Arsonval" in *Archives of Physical Therapy, X-ray, Radium: Jubilee Number in Honour of Professor Arséne D'Arsonval 13*(1932):717-726.

3. In the first century, A.D., Scribonius Largus prescribed an electric ray for the treatment of gouty toes. See P. Kellaway, "The Part Played by Electric Fish in the Early History of Bioelectricity and Electrotherapy," *Bulletin of the History of Medicine 20* (1946):130-131.

4. See A. B. Davis and M.S. Dreyfuss, *The Finest Instruments Ever Made; A Bibliography of Medical, Dental, Optical and Pharmaceutical Trade Literature, 1700-1939* (Arlington, Mass.: Medical History Publishing Associates, 1986), 383-384.

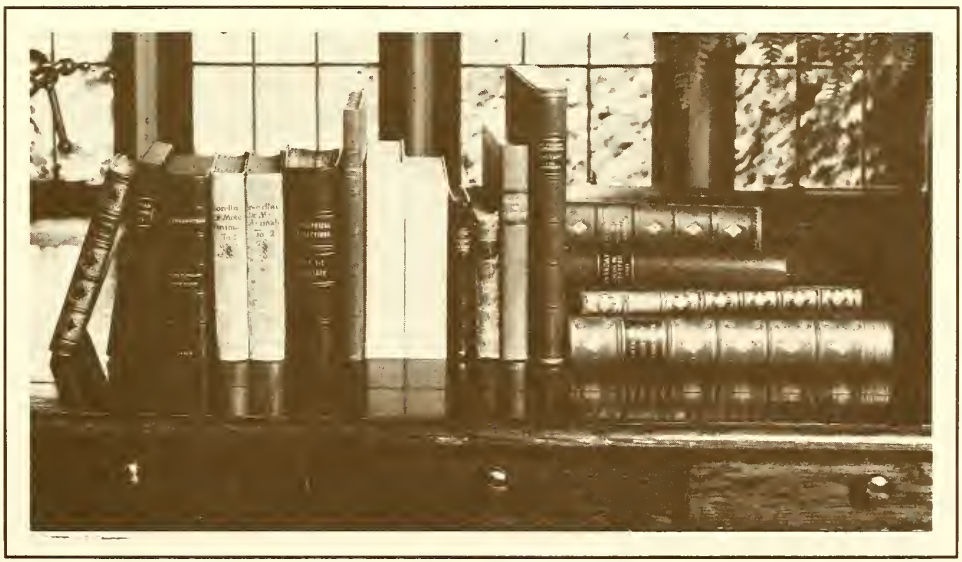
Coin-operated Electrical Treatment Device, early twentieth century. (Photo courtesy of The Bakken.)

THE BAKKEN MUSEUM OF ELECTRICITY IN LIFE

Director:	John E. Senior
Curator:	Albert Kuhfeld
Librarian:	Elizabeth Ihrig
Location:	3537 Zenith Avenue South, Minneapolis, Minnesota USA 55416 Property covers almost 3 acres in a residential neighborhood on the shores of Lake Calhoun in South Minneapolis. English landscape surrounds the house: a ravine newly planted with pines, woodland paths sloping to Lake Calhoun, a lily-pad pond and successive beds of tulips, iris, artemesia, foxglove and chrysanthemums. By car the Bakken Museum is 30 minutes from Minneapolis/St. Paul International airport, 15 minutes from downtown Minneapolis, and 30 minutes from the University of Minnesota campus.
Telephone:	(612)927-6508
Hours:	By appointment. 9:00 a.m. - 5:00 p.m. (Monday through Friday, except holidays)
Admission:	Free
Use of Collections:	Open to any researcher by appointment, which may be made by writing or calling the librarian or curator. Although materials may be used only on the premises, photocopies may be made depending on the condition of the individual item. Arrangements may also be made for the production of slides or photographs.

AUTHOR

John Senior is Director of The Bakken and has been working in history of medicine museums for the last thirteen years. Prior to his position in Minneapolis, Mr. Senior was Curator of the Museum of the History of Medicine at the Academy of Medicine in Toronto. His interests in the history of science and medicine first arose during his studies in London and he later pursued a master of arts degree at the Institute of the History and Philosophy of Science and Technology at the University of Toronto. Currently he is working with Robin Overmier, the curator of the Wangansteen Library at the University of Minnesota, on a printed catalog of the book collection and writing a history of pain.



A few of the volumes representative of The Bakken Museum's splendid collections documenting the history and applications of electromagnetism in the life sciences. (Photo courtesy of The Bakken.)

Early Modern Cardiology: An Exhibit at the Heart House

Recent donations and purchases, in combination with earlier holdings, have enabled staff of The Bakken Museum of Electricity in Life to mount a major new exhibit at the American College of Cardiology's Heart House in Bethesda, Maryland. The exhibit traces early developments in four areas: study of the pulse cycle; acoustic cardiography; electrocardiography; electrical regulation and augmentation of the heartbeat.

The section on the pulse cycle begins with equipment designed by Étienne Jules Marey (1830-1904) for determination of absolute blood pressures. The equipment on display (by Charles Verdin, ca. 1880) is an elaboration of earlier experiments and shows the effects of varying external pressure by placing the forearm into a sealed hydraulic tank. The pulse forces blood into the forearm, then water pressure forces it back out. Study of the fluctuating volume of water displaced by the forearm allows an absolute determination of blood pressure at various points of the cardiac cycle.

The exhibit then is separated into two sections to show the application of direct pulse measurement to the physician's art (represented by Marey's direct-writing wrist sphygmograph and Stein's optical sphygmograph) and laboratory testing of pulse propagation theory by a mechanical circulatory system analogue (represented by Professor Frederiq's model, ca. 1900).

Graphic recording of heart sounds requires an appropriate *transducer*, able to convert sound into deflection. Early experimenters used Dr. Boudet's micro-stethoscope, a form of carbon microphone. Coupled with the string galvanometer, it allowed synchronized dual-trace recordings of electrocardiogram and heart sounds. The 1950 endocardiograph in this exhibit is more sophisticated in design, but the same in function. Finally,

First implantable pacemaker, developed in Sweden, utilized NiCad batteries recharged by an external RF field. This pacemaker was implanted in a patient on March 31, 1960. (Photo courtesy of The Bakken Museum of Electricity in Life.)

Rack-mounted Spatial Vector Electrocardiograph (SVEC) developed by Otto Schmitt in the 1940s for three-dimensional electrocardiography. Torso phantom, partially seen in rear, was used to calibrate electrode placement. (Photo courtesy of The Bakken Museum of Electricity in Life.)

bringing the studies up to 1987, the exhibit shows early stages in the computer analysis of heart sounds, represented by the symmetrized phonocardiograms of Clifford Pickover.

Early phonocardiography used the string galvanometer--but this device's true medical application was the electrocardiograph. First developed for this use by Willem Einthoven in the late nineteenth century, later researchers found that Einthoven's 1903 EKG recordings are as good as those found in modern practice, but they were made with bulky, balky equipment needing a half-dozen technicians to operate. Improvements in those early days were chiefly in terms of convenience rather than capability. The massive EKG recorders of the first twenty years are represented in this exhibit by photos; the earliest actual machine is a 1928 portable string galvanometer EKG by Boulitte, weighing a mere eighty pounds.

Later developments in the EKG are represented by artifacts from a recent donation by Otto Schmitt, Ph.D.: the SVEC (Spatial Vector ElectroCardiograph) display unit he developed in the forties and fifties, and the torso phantom he used to calibrate electrode placements.

Hearts were being stimulated electrically long before the electrocardiogram or the pacemaker came along. Duchenne de Boulogne used precordial faradization to treat tachycardia in a manner not unlike cardioversion. The exhibit features a detailed discussion from an 1870 article of Duchenne's, paired with a contemporaneous medical coil.

In the 1930s, the "Elec-Treat Mechanical Heart" straddled the border between legitimate and crackpot. It was a self-contained stimulating coil, which in its product literature contained the claim that muscular activity would combine with the one-way valves of the veins to force blood back to the body core, thus aiding circulation and assisting the heart.

Finally, the excellent collection of pacemakers recently donated to the Bakken by Dryden Morse, M.D., documents the implantable pacemaker from its origins into the eighties. Early news accounts of pacemaker surgery and "men with two hearts" underline the impact pacing had upon the medical science of the day.

This is a report of a brief article on the Heart House exhibit which originally appeared in The Electric Quarterly 9 *(Fall 1987):2. It is reprinted with the kind permission of the editor.*

ANNOUNCEMENTS

BIBLIOGRAPHY OF MATERIALS AVAILABLE FROM NATIONAL LIBRARY OF MEDICINE (HISTORY OF MEDICINE DIVISION)

Periodically we will be including for our readers an updated listing of pamphlets available free of charge from the History of Medicine Division of the National Library of Medicine. Single copies of this material can be obtained by writing to: Chief, History of Medicine Division, National Library of Medicine, 8600 Rockville Pike, Bethesda, Maryland, 20894.

American Contributions to Cardiovascular Medicine and Surgery: An Exhibit. By Bruce Fye, 1986. (22 pp.)

American Contributions to the New Age of Dental Research. By Ruth Harris, 1988. (25 pp.)

A Biomedical Index to the Correspondence of René Descartes. By Thomas Steele Hall, 1986. (15 pp.)

Blacks in American Medicine: A Bibliography of Secondary Sources, 1970-1987. By Peter B. Hirtle and Diane E. Rothenberg, 1988. (25 pp.)

Caricatures from the Art Collection. 1959. (24 pp.)

Catalog of an Exhibit in Honor of the Sesquicentennial of the Birth of Louis Pasteur. 1972. (16 pp.)

A Century of American Physiology: An Exhibit. By John Parascandola, Toby Appel and Daniel Gilbert, 1987. (19 pp.)

Conrad Gesner--A Quartercentenary Exhibit. By Richard J. Durling, 1965. (20 pp.)

Educating Physicians in the Nineteenth Century: Selected Titles Bearing on the Subject in the Collections of the National Library of Medicine. By Thomas Neville Bonner, 1988. (11 pp.)

Highlights in the Development of Medical History in the United States. By James H. Cassedy, 1984. (30 pp.)

Historical Treasures of the National Library of Medicine. 1985 (6 pp.)

The History of Cardiology: A Bibliography of Secondary Sources. By W. Bruce Fye, 1986. (6 pp.)

John Shaw Billings: An Autobiographical Fragment, 1905. A facsimile copy of the original manuscript, 1965.

John Shaw Billings Centennial: An Exhibit Depicting the Life and Career of Dr. John Shaw Billings, 1965.

Medical Symbolism in Books of the Renaissance and Baroque. 1966 (22 pp.)

Medicine of the Civil War. 1973. (8pp.)

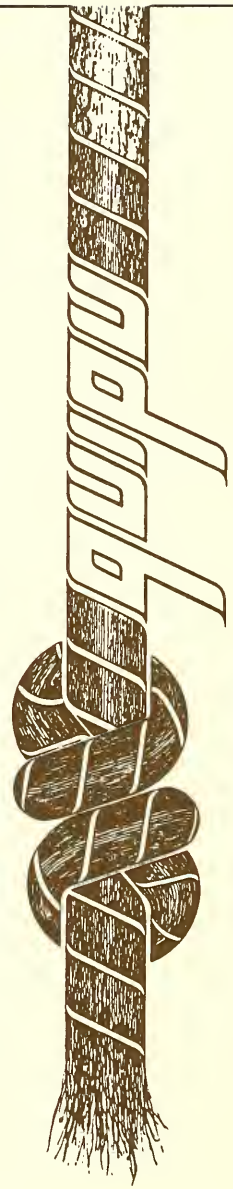
Medicine on the Early Western Frontier. 1978. (12 pp.)

The New Age of Health Laboratories, 1885-1915: An Exhibit. By James H. Cassedy, 1987. (18 pp.)

The Prints and Photographs Collection of the National Library of Medicine. 1967.

A Summary Checklist of Medical Manuscripts on Microfilm Held by the National Library of Medicine. 1968. (14 pp.)

Wood's Library of Standard Medical Authors, 1879-1886: A Checklist. By Philip Teigen, 1985. (31 pp.)



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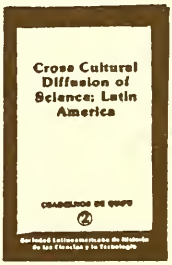

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